IN THIS ISSUE: Marketing Power Company Securities

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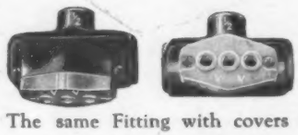

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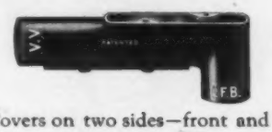

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THE AEROPLANE A COMING FACTOR IN THE POWER INDUSTRY OF THE WEST

The aeroplane has passed the stage of experimentation in the service of the power companies of the West. Inaccessible mountain power developments and vast distances involved alike in construction and distribution, offer an opportunity for this swift and flexible means of conveyance of which advantage is already being taken in such instances as the fire patrol regularly a part now of western forest service, the definite proposal of the Southern California Edison Company to expedite construction by the aerial transportation of essential preliminary machinery in districts where roads have not yet been constructed, and the recent announcement by the San Joaquin Light and Power Corporation of the construction of landing fields on their mountain projects. The plane here shown is that of R. C. Starr, who had entire charge of construction on the recently completed Kerckhoff project and who has adopted this method of expediting transportation between construction jobs.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 45 SAN FRANCISCO, SEPTEMBER 1, 1920 Number 5

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Electric Utility Financing Should Be Supported

An Editorial

The program of construction which was announced at the recent N. E. L. A. convention this spring, and which it was estimated would call for the expenditure in the West of $700,000,000 in the next 9 years has already been begun—and the financing of this construction has become one of the major functions of the electrical industry of this coast. More, it has become a question of major concern to the West itself. Because it believes in the future development of the West and because it believes that this development is inextricably bound up in the adequate growth of the electric companies which serve it, the Journal of Electricity desires to say its word in the support of the stock and bond issues of electrical companies now on the market and those which will hereafter call upon the public for the money to carry out their construction programs.

The West in its natural resources is one of the wealthiest regions of the nation. It stands foremost in fruit production and ranks high in dairy and cattle products. Its mineral wealth places it in the first rank in this field; its standing timber makes it the great lumber region of the nation. This development both in agriculture and industry is only in its beginnings. It is as yet undetermined exactly what effect the raise in freight rates will have on industry on the Pacific Coast, but it is certain to mean that more and more will the raw materials of which we have so bountiful a supply be made up into finished products on this coast for use in local markets and for shipment in the more compact form, both to the Eastern markets and the Orient.

What is perhaps not so well understood is the close relation which the development of the electrical industry bears to this growth of the West. Western agriculture is dependent upon irrigation. To as great an extent as possible, of course, gravity irrigation is used, but this is limited in the areas which it will serve and electric pumping has long since taken over a great share of the burden. Thousands upon thousands of acres of land now under cultivation are entirely dependent for their fertility upon electric pumping—and the great acres which await cultivation are largely looking to the services of the electrical companies to make them available for agricultural purposes. In this last year of water shortage, when the power companies were unable to take on new service, thousands of applicants were unable to install the pumps they desired, thousands of projects were postponed until electricity should be available. The one instance of the rice growers of California, who are almost entirely dependent upon electricity for their water supply and who this year were forced to restrict their intended acreage owing to the power shortage, is proof of the intimate relationship between electricity and agriculture in this state.

Industry is not less dependent upon hydroelectric power. The West has no adequate supply of coal; lumber, although plentiful, is not present in such a surplusage as to make it available as a fuel except in restricted districts, and the price of oil is becoming almost prohibitive. This tends to make all industry dependent upon hydroelectric sources for its power—but beyond this fact there are many lines of activity which are inseparably linked with cheap and reliable electric power. Such a one is the electrochemical field which is coming to be one of the important industries of this region. There are tremendous chemical deposits west of the Rockies which have hitherto been shipped east in the raw. The combination of high freight rates between the Eastern markets and this coast and higher power rates in the East has tended to increase the refining of these products in the West, an industry wholly dependent upon electric power for its possibilities of existence. The use of electricity for industrial heating purposes is coming to be quite general and the many industries which are dependent upon the use of electric furnaces are another instance of dependence upon this source of power.

The western region as a whole stands first in its per capita consumption of electricity, the average citizen in this region using 2.2 times as much electricity as the average citizen in the remainder of the United States. The Pacific Coast already uses more electricity on its farms than all the rest of the United States put together and the dependence of its future upon electric pumping shows that this ratio will be increased, as well as maintained.

Figures of power development within the past ten years and predictions of what will be needed in

the future show strikingly how the growth of the region is paralleled by this great "servant industry." Last February, in view of the fact that a very distinguished convention of the National Electric Light Association was to convene at Pasadena during May of this year, a group of men prominent in the power industry met in San Francisco in order to formulate a report on the water power development of the West which should convey in an authentic and authoritative manner the statistical data concerning water power in the states west of the Rockies. On this committee were Mortimer Fleishhacker, W. A. Brackenridge, John A. Britton, H. T. Edgar, C. C. Egbert, H. I. Harriman, D. L. Huntington, H. F. Jackson, Frank M. Kerr, A. W. Leonard, J. D. McKee, G. W. Talbot, A. B. West, A. G. Wishon and Franklin T. Griffith. It was decided to put into the field at once a committee of investigation to gather these data and the Journal of Electricity was asked to superintend the work. The results of this investigation which were reported in full at the Pasadena convention, contained statistical information on power development which is epoch-making in its proportions.

In the first place, by combining the actual power that has been consumed by the power companies of the West during the last twelve years and superimposing these curves one upon the other, a total power curve of power usage was derived. Perhaps the most significant aspect of this curve is the fact that its upward progress is steady. If a curve of the unsatisfied demand could be plotted and run simultaneously, a fact would be apparent which these figures cannot show—that is, that the need for power has increased at an even greater rate than it was possible to supply it. The war did not lessen the demand appreciably, while at the same time it postponed the possibilities of construction, and the present situation is one of existing power shortage in California and impending shortage in other districts of the West. Agriculture, industries and city development alike are being cramped for need of the power to supply them at the rate they stand ready to expand.

This curve of power demand was then extended over the period of eight years immediately before us, anticipating what power development must be undertaken to meet these needs. Figures used were based on most careful estimates of the power companies serving this region upon actual demand anticipated and represent, if anything, a conservative picture of possibilities. The usage of power has been increasing for years past in an expanding geometric ratio and it is estimated, based upon these figures, that something like $700,000,000 must be expended in power development in the West alone within the next nine years to meet the growing demand in industry and agriculture.

So completely is the regulation of public utility companies in this state within the hands of the public utility commission, that the assurance of an adequate return to investors who shall supply the funds for this necessary construction lies largely within the powers of this commission. So clearly do the Western commissions realize their responsibility and so progressive is the stand that they have taken that E. O. Edgerton, the president of the California Railroad Commission, in a forceful address at the Pasadena convention, could express himself as follows:

"I believe that we have assets in California which, if properly used, will produce the fundamentals of inducement to investors, this being absolute security of the investment itself, the assurance that the dollar will not become 90 cents or something less, coupled with the certainty and regularity of return. And if we have these assets, why not make use of them, and then if money is available on any terms, we will get that money.

"What are these assets? Power houses and transmission lines? Surely. But over and above that we have the assets of a great, vital, essential service—a service which the people must have, a service which they cannot get along without. And that is an assurance to an investor that that asset cannot disappear. My judgment is that the Railroad Commission has that asset in trust for the people, and I think they can make bitter complaint if we do not use that asset, coupled with others, so as to produce the necessary money to do the absolutely essential development that must go forward in this state."

In view of the facts, then, that fundamentally the West will progress only so fast as hydroelectric energy is placed upon the transmission lines, and that the state of California of the forty-eight states of the Union is outranked by only one other in possibilities of this development, and, thirdly, that every citizen is vitally interested in this development, and, fourthly, that agriculture and industry today in this great commonwealth are demanding power in ever-increasing capacity at a rate at which development will find difficulty in keeping pace with the demand, it would seem that an investment in these securities today presents the soundest type of investment that can be found. And the thing which the Journal of Electricity has in mind, alluded to in the opening statement of this editorial, is that, so indelibly are the progress and industrial and agricultural development of this region intertwined with the development of its hydroelectric resources that our citizens should give every encouragement possible to this development; and insofar as these companies are faithfully and efficiently and in a businesslike way proceeding about the development of these great resources, the people of this great district should reward them for their service by liberally backing them up in seeing to it that a reasonable, indeed a generous, return be given to them on the moneys invested.

During the past several months the people of the West seem to be awakening to this fact, and as a consequence investors in these securities may feel well assured that the regulatory bodies who have in trust the fixing of rates will see to it that reasonable returns be allowed in earning power so that these developments may continue in ever-increasing geometric ratio.

The Aeroplane in Mountain Construction

To those who read the signs, the announcement by the San Joaquin Light & Power Corporation that it is to build aeroplane landing fields in connection with each of its mountain projects opens up a picture of the future usefulness of this means of conveyance in power development and maintenance. Ever since the war period the aeroplane idea has interested power company officials faced with the necessity of opening up districts into which no road has been built, of patrolling hundreds of miles of transmission line and of covering mere distances between points on their own systems which may lie a day's journey apart. The idea may now be said to have passed the point of mere speculation;—the aeroplane is actually at work in the service of the power industry and its province is unquestionably destined to be extended as its full usefulness comes to be appreciated.

For some time the aeroplane forest patrol has been a regular part of Western forest service and those who have recently been in the mountains are familiar with the purr of its guardianship overhead, even in the most inaccessible fastnesses of the high ranges. Power companies are equally concerned in preventing the menace of forest fires to their mountain properties, a problem the magnitude of which is to be judged from the fact that one day in August saw over two hundred incipient fires start in the forest ranges of California, most of which were reported at once and checked without damage. The suggestion inevitably presents itself that transmission lines are susceptible to the same method of patrol at a saving of considerable time and with great comprehensiveness. Records are already at hand of one instance in which pole trouble along a transmission line was reported to the company by a passing aeroplane.

Construction work on mountain projects is often delayed for months by the necessity of building roads or laying rails into an unopened region. It has been shown to be feasible to transport the lighter pieces of machinery by aeroplane, a possibility which should make for many time savings in construction work.

These are only beginnings, but they show the way to a real field for development, in which the aeroplane will become the serious servant of industry as well as a medium of sport and a weapon of war.

The Cooperative Idea in the Northwest

Far beyond the boundaries of California has gone the fame of the accomplishments of the California Electrical Cooperative Campaign. Forceful endorsement of this work was given by the Committee on Cooperation appointed by President Ballard to investigate the subject and which later reported upon it at the Pasadena Convention of the National Electric Light Association.

In the remaining districts outside of California, comprising the Pacific Coast States, great activity at the present time is being shown in the formation of similar movements. At Salt Lake City a movement is under way which is to embrace the intermountain district, comprising Salt Lake City, possibly Butte, Montana, Boise, Idaho, and other intervening localities.

In Vancouver, British Columbia, a movement is under way to start a miniature cooperative campaign in that vicinity. The particular territory tributary to this district is very small, perhaps numbering seven or eight communities served by central station service. However, the evident desire to introduce active cooperative ideals is manifest on all sides in British Columbia.

But the one big place, or rather district, where the desire for the cooperative idea has grown to such an extent that it will unquestionably bear fruit, is the district comprising Portland, Seattle, and Spokane. The Advisory Committee of the Northwest Electric Light and Power Association, which has taken the matter of the formulation of a cooperative campaign under advisement, has already completed its policy and stands ready to present to the Association, at the forthcoming Spokane convention, its recommendation that a definite plan of cooperation as outlined by the committee be put into effect as soon as possible. The entire matter must, however, have the attention of all Class A members of the Association, and as a consequence it will be formally presented to them at the coming convention in September, at which time it is hoped that the report of the Advisory Committee will be adopted and the machinery set in motion for the cooperation of all electrical interests in the Northwest.

The Journal of Electricity has ever been a dominant factor in pointing the way towards the helpful principles of the cooperative idea. It has nourished and fostered the California development, and as a consequence it endorses wholeheartedly the action of the Northwest and commends in the highest degree the efforts of the Advisory Committee of the Northwest Electric Light and Power Association in its endeavor to get under way with a specific and definite plan of action.

Industrial Development in California

The survey of industrial plants in California which use electricity as a main motive power, a digest of which appears on another page of this issue, presents a picture of industrial activity on the western coast which may be a surprise to many. About 1300 plants were included in the survey, of which the larger number were enterprises devoted to various aspects in the preparation of foodstuffs, but among which the iron and steel industries used the largest block of power. One of the unexpected features was the important position of the shipbuilding industries which may be said almost to have originated with the war but which have maintained their position in the first rank of electricity consuming industries into the peace period. The cement industry, the lumber industry and the electrochemical industry also rank high in relative importance. The vast field of agricultural uses has properly not been included as an industry.

This survey has been extended to the other states of the West, but returns are available as yet only for California and even for this district are of necessity incomplete. The figures are sufficiently significant, however, to indicate the fact that the West is becoming an industrial district of importance. In spite of high freight rates, car shortage, water shortage, high prices and a business market somewhat depressed the power company load of this region has steadily advanced with a buoyancy which is the firmest guarantee of future growth and a tremendous asset in the marketing of Western public utility securities.

Giant Industries Enter the West

Each day new and interesting announcements are being made of the entrance of great new industries into the business life of the West. Not only has the institution of a silk manufacturing industry, amounting to some millions of dollars in capitalization, proven of recent interest in central California, but the entrance of the Goodyear Rubber Company into Los Angeles and vicinity, with its expenditure of twenty million dollars, is distinctly significant of the new industrial life of the West. Much has been heard throughout the West of the power shortage in California during the current season, and yet it is understood that this one industry, the Goodyear Rubber Company, will use power in such vast quantities as to equal the whole power shortage in California of the present year.

That the new freight rates from the East will have a tendency to encourage western industrial development is daily becoming more and more a conviction with those who study closely the situation in the West. While the initial cost will unquestionably be high in installations of this nature, nevertheless the future marketing of manufactured material on a competitive basis with other districts will be greatly facilitated. As a consequence, the entrance of new industries day by day is strengthening the spirit of optimism throughout the West.

A Broad Field for N. E. L. A. Activities

One of the important results of the Pasadena N. E. L. A. convention was the formation of a Bureau of Public Relations which should place this vital work of publicity and research on a permanently functioning basis. One of the most wholesome signs of the sound progress of the electrical industry is their open recognition of this factor of their existence as essential. With the public utility properly answerable to the public for financial support and for the rewards for its services as well there is no more important aspect of N. E. L. A. work than to keep that public properly informed as to the facts of the situation. The foundation which was laid for the establishment of just such a bureau was one of the important contributions of the last administration and the announcement of the appointment of R. H. Ballard, vice-president and general manager of the Southern California Edison Company and former president of the N. E. L. A., to the chairmanship of this section and also to membership on the public policy committee is of vital interest to the West. It has often been stated that the failure of most organizations lies in the confining of their work and influence to the one period of the year at which they convene.

The Putting in of the Kerckhoff Power House

The past semi-monthly period has witnessed the putting in of the Kerckhoff Power Plant of the San Joaquin Light & Power Corporation. This development work has brought forth unusual comment from all quarters, particularly in that there was a lack of material and a shortage of men throughout the construction operations; indeed at times the obstacles to be overcome seemed almost superhuman. Yet the work has gone forward on schedule time, and now, after the lapse of scarcely a year and a quarter since the great dam was undertaken, the long tunnel is driven and the power house is in operation. The thirty thousand kilowatts just made available will go far toward relieving the power shortage situation in south central California. The power development as it stands presents an unusually attractive feature for the corporation in that it not only utilizes the rivers of the San Joaquin and the waters farther upstream that are used in a chain of power plants owned by the San Joaquin Light and Power Corporation, but also it makes use of the Big Creek waters of the Southern California Edison Company, and indeed of all the waters which that company is to develop in the future. As a consequence, then, the Kerckhoff power development stands forth as an unusual installation in the expedition which has characterized its building, the foresight used in its installation, the maximum economy obtained, and the fact that full advantage has been taken of natural facilities.

The Selling of 8% Bonds in California

Announcement is made elsewhere in this issue of the Journal of Electricity of the fact that a syndicate has underwritten a million dollars' worth of the 8% gold bonds of the Pacific Power & Light Company with the intention of disposing of them in central California. The Pacific Power & Light Company, as is well known to our readers, has its location along the Columbia River, both in Oregon and Washington, and feeds an unusually prosperous and growing agricultural community. The investment is unquestionably a sound one. The existing fact, however, is that California is to be invaded from the North with the sale of hydroelectric securities, and that 8% interest is to be offered on these bonds. The entire fact brings forcefully to mind the question of interest-bearing securities of this nature. Undoubtedly regulating bodies must come more and more to the conclusion that greater returns than 7% must be allowed on securities of current issue if a ready market is to be found for them. That California is subject to invasion from the North only instances the fact that other communities are allowing larger rates of return, and as a consequence if the vast financing is to be accomplished in the West that it is confidently believed will take place, liberal returns must be allowed upon the money so subscribed.

Financial Status of Western Power Companies

It is an interesting fact that two-thirds of the leading power companies of the West showed an increase in their corporate surplus from 1918 to 1919, and in the cases where this surplus decreased there was a very good reason for the decrease. While a comparative table such as that appearing on another page of this issue of the Journal of Electricity, showing the balance sheets of the larger power companies, can furnish many very interesting facts, still, conclusions should not be drawn too hastily. The decrease in the surplus of the San Joaquin Light & Power Corporation, for instance, is due to the fact that that company during 1919 was carrying on a great construction program and had not yet marketed the bonds which were to pay for these additions to its properties. This bond issue is now being rapidly sold and will replenish the money which that company borrowed from itself. As another instance of judging too hastily, consider the case of the Portland Railway Light and Power Company, which shows that no dividends were paid last year. While this company is making a fair profit on the electricity it sells for light and power, the railway system of Portland is draining the company of its profits on the other sales. Now that the fares in that city have been increased the system will not have to carry an extra burden, but will be able to make a profit that will assure the stockholders of the company a fair rate of return on the money they have invested.

The Journal of Electricity believes that it is a good thing to bring the balance sheets of the various Western power companies to the attention of the members of the electrical industry. We are all vitally concerned with the financial condition of the central stations, as it affects the welfare of every member of the industry. If the power companies are making a fair profit on their investment we should know it and tell the story of the stability of the industry. But if the power companies are not making a fair return, then it should be the duty of every member of the industry to see why. If the company is suffering from inadequate rates this fact should be brought to the attention of the regulatory commission of the state in which that company is located. It should be borne in mind that your local power company is the gage of your business condition; that as it prospers and as it suffers from inadequate rates, just in that proportion will the prosperity of your business suffer.

Western Power Companies' Securities

The majority of the Western power companies have schemes for selling their securities to consumers and employes, as it is a recognized fact that a widespread distribution of stocks or bonds among consumers and employes is a very desirable thing. As an instance of this it should be noted that when the San Joaquin Light & Power Corporation recently applied for an increase in rates a large number of consumers of that company who were also financially interested in the company to the extent of one or two bonds, appeared before the Railroad Commission with a request that the increase be granted. Being stock or bondholders in the company gave them an opportunity to know that the development of their community depended upon the healthy financial condition of their local power company.

The stock selling plans of several representative power companies of the West appear on another page of this issue of the Journal of Electricity and if every member of the electrical industry were to take advantage of one of the investments offered there, it would be a great help in solving the problem of financing which now confronts the Western power companies. That nearly a billion dollars is to be spent in hydroelectric construction in territory west of the Rockies in the next ten years is now a well known fact; if every member of the electrical industry supports his local power company financially as well as morally, this big construction program can be put over. The purchase of some securities of your local power company will prove that you believe in the future of the West, that you have confidence in the electrical industry and the part it will play in the upbuilding of the West, and that you believe in yourself. The California Association of Electrical Contractors and Dealers have adopted a placard which will be placed in the window of every member owning some central station security, and some mark should be given to those who have invested in any central station security in the West so that the "slackers" might be easily recognized.

THE INDUSTRIES OF THE WEST

are growing through the use of hydroelectric power.

Something of this development will be told in the September 15th issue of the Journal of Electricity.

The romantic story of a large Western power company, as personally told by its general manager, will be given.

This issue will also contain the latest word from the Spokane Convention of the Northwest Electric Light and Power Association.

Financing Public Utilities

(The extensive construction programs planned by Western power companies for the next ten years will call for the expenditure of vast sums of money. How this money is to be raised is the most vital question now before the power companies, and some of their plans for handling it are described below.—The Editor.)

It is a recognized fact that the greatest problem of the western power companies in the next decade is that of raising sufficient money to carry on the vast construction program which they have outlined as necessary to keep up with the industrial development of the West. The need for this was very ably stated by E. O. Edgerton, president of the California Railroad Commission, at the N. E. L. A. convention at Pasadena last May when he said:

"I recognize that we cannot get money out here from the East into California by threats, by arguments, by any form of punishment, by any suggestion that because of investments already made they cannot quit. I recognize that the money must come by inducement, and in my judgment it can be induced without paying an exorbitant and unreasonable price for it. I believe that we have assets in California, which if properly used will produce the fundamentals of inducement to investors, this being absolute security of the investment itself, the assurance that the dollars will not become ninety cents or something less, coupled with the certainty and regularity of returns. What are these assets? Power houses and transmission lines? Surely. But over and above that we have the asset of a great, vital and essential service—a service that the people must have—a service that they cannot get along without, and that is an assurance to an investor that that asset cannot disappear. My judgment is that the Railroad Commission has that asset in trust for the people, and I think they can make bitter complaint if we do not use that asset coupled with others so as to produce the necessary money to do the absolutely essential development that must go forward in this state."

It is easy to see, by applying the self-interest idea, why every member of the electrical industry should subscribe to the securities of the central station which supplies him. The central station may be likened to the reservoir which is built in the mountains, and the other branches of the industry could be likened to the power house and the transmission lines: each a complete thing in itself and yet perfectly useless without the other. When your central station is in a healthy condition it is expanding—which necessitates the buying of new material—and is supplying a large and possibly increasing amount of current to its consumers. The activity of this central station is reflected upon the manufacturer, the jobber and the contractor-dealer in that territory, and they prosper as the central stations prosper.

In presenting the various stock selling plans of the following power companies of the West, it is with the idea that every member of the electrical industry in the territory served by that central station will thereby become acquainted with the securities that company has for sale, will see to it that his customers are acquainted with the value of this security, and will show his confidence in that company by purchasing some of its stock.

Pacific Gas & Electric Company

In answer to a questionnaire, Mr. A. F. Hockenbeamer, second vice-president and treasurer of the Pacific Gas & Electric Company of San Francisco, California, stated as follows:

"It is not likely that we will issue any hundred dollar bonds, as we have in our first preferred six per cent stock issue a very excellent medium of effecting a wide distribution of the ownership of this property. We believe that this stock issue is not only for all practical purposes as safe a medium of investment as bonds, but can be sold to give the investor a substantially higher return. It also possesses the advantage to the investor of being exempt from the Federal income tax, whereas bonds in any of the so-called tax-free covenants are exempt only to a maximum of two per cent. The stock is purchasable in as small an amount as one share, of the par value of one hundred dollars. Dividends on the stock are paid four times a year as against semi-annual interest payments on bonds.

"We are thorough believers in the value of a widespread distribution of our securities among the people living in our territory, as evidenced by the fact that we were the first public utility in the United States to put this theory into actual practice. We made a beginning in June, 1914, a little over six years ago, and since then have distributed directly, over the counter as it were, more than $8,500,000.00 par value of this first preferred six per cent stock among our customers and others living in the territory served by us. We have a widespread distribution of our stock and bonds, there being no less than 14,731 residents of California owners of these securities out of a total of 28,603. The distribution of public utility securities, whether they be stocks or bonds, among the jobbers, manufacturers and contractor-dealers will undoubtedly help the industry, and we are very glad indeed to see the Journal of Electricity using its influence in the furtherance of this movement."

The securities of the Pacific Gas & Electric Company which are now on the market are their General and Refunding five per cent bonds, the First Preferred six per cent stock, the Original Preferred stock and the Common stock. They aggregate over $67,000,000.00. While the Pacific Gas & Electric Company has no definite plans for stock or bond issues in the next five years, the construction program calls for an expenditure of over $123,000,000.00, which must be raised by the sale of securities. In 1914 the Pacific Gas & Electric Company blazed the trail in the field of customer ownership, which has since then been established throughout the United States to such a degree that $40,000,000.00 worth of central station securities are held by some 36,000 individuals, 90% of whom had never owned utility stock. California was a good place in which to make this experiment as it ranks twelfth among the states in population, but holds first place in per capita wealth.

The campaign put on by this company was started in June, 1914, by a circular being distributed to all of the officers and employes of the company. A few months later a circular was sent out to all consumers, about 260,000 in number, the addressograph used in making out the gas and electric bills being used to address the envelopes. A month later a second circular was sent out to practically all consumers, but this time the distribution was effected in each district by means of the collectors who delivered the circulars as they covered their routes in the performance of their ordinary duties. District managers and heads of departments were instructed in the advantages of this stock, and an advertising cam-

paign was carried on in the newspapers covering the districts served by the company. A stock sales department was established at the head office and as the result of this campaign on December 31, 1918, the total number of stockholders was 8,242, with average holdings of $7,160.00 as compared with 2,898 stockholders in 1914, with an average holding of $14,530.00 par value. The company has a plan whereby employes may buy stock on the partial payment plan which has been taken advantage of by a large number of the employes. The result of this is obvious, and the laborer who owns one share of stock is liable to be a great deal more interested in the welfare of the company than the magnate who holds a thousand shares.

Southern California Edison Company

The Southern California Edison Company has three stock issues, a First and Second Preferred and an issue of Common stock, of which there is $35,-116,272 outstanding out of a total authorized of $100,000,000. The company's construction program provides for an annual expenditure of from $10,000,-000 to $15,000,000 of which approximately 66 2/3 will be provided through the sale of bonds and the remainder by junior financing. Employes of the company are allowed to purchase stock in an amount ten times their monthly salary, that is an employe receiving $100 per month would be allowed to purchase $1000 par value of stock, or ten shares. There are two forms of contract by which an employe can obtain stock. The first one, which any employe can accept, is to deduct seven and one-half per cent of his salary each month and credit it to his stock account. The other contract is for those employes who receive less than $100 per month, and by this contract one dollar per share per month is deducted from their salary and credited to their stock account. At the end of each quarter the dividend is credited to the employe's stock account and six per cent is charged on all deferred payments. In cases where an employe leaves the company without completely paying for his stock the amount he has paid in is refunded to him plus any dividends that have accrued to his account. If he has, however, sufficient money paid in to pay for one or more shares of stock, a certificate is issued for the nearest full paid share and the balance is refunded in cash.

A securities department has been formed which is under the charge of A. N. Kemp, vice-president in charge of finance. This department in addition to planning the campaign for the sale of stocks, writing the advertisements, etc., also handles the transfer books and mailing of dividends, and furnishes information to the stockholders. A campaign to sell the common stock was launched in August, 1917, since which date over $8,500,000 worth of stock has been sold, to a total of eight thousand subscribers. The advertising has been done by means of the newspapers in the territory served by the company, and it has been found that the best results have been obtained by short, sharp advertising campaigns of four or five days spaced a few months apart. The entire company's force of about 3,000 permanent employes has become a sales organization with the district managers as direct sales representatives. About fifteen per cent of the sales were made by the banks with which the company had accounts, all of which had subscription blanks.

San Joaquin Light & Power Corporation

Situated in the San Joaquin Valley, whose development has been held back by a lack of power, the San Joaquin Light & Power Corporation has started the sale of $10,000,000 of 7% Preferred stock directly through the company on the "Self-Interest" plan which was conceived by A. Emory Wishon, assistant general manager of the company. Through

The effective newspaper advertising which the San Joaquin Light & Power Corporation used in financing its recent bond issue

this plan of proving to consumers and employes that it is to their best interests to see the valley developed, which is only possible through the development of large amounts of power by the company, they are going ahead selling on a cash basis, except to employes who can purchase stock at the rate of $7.50 per month. In the past year the San Joaquin Light & Power Corporation have practically doubled their capacity and the faith that this company has in the future of the valley is being rewarded by the way in which they are disposing of their stock issue.

The advertising for the sale of this issue has been carried on by using the newspapers, magazines, follow-up letters, and printed notices on the back of all outgoing bills and letters. The moving picture has played a part in the company's campaign also, as a film has been made showing the construction of the Kerckhoff Power House, which has just recently been put into operation, and showing also the manner in which the use of electricity develops and enhances the value of the lands in the valley served by the company. The company have also endeavored to interest the local public in their securities by means of advertising and general education to give interest to the story of electricity, to interest every individual in the territory served in the financing and development of the company, and to show that their own individual interests and the development of their own locality depend on the growth of the company and its ability to develop sufficient electricity to supply the rapidly increasing demand.

Great Western Power Company

The Great Western Power Company have a plan of selling to employes the Preferred stock of the com-

pany in twenty equal monthly payments. These payments are deducted from the employe's pay check, and interest is paid by the company at the rate of six per cent on all installments until such time as the stock is paid for. On the date of the last payment, the stock certificate is made out to the purchaser-employe and the dividends accrue from that date at the rate of seven per cent. Stock is also being sold to consumers on a time payment plan where the consumer makes an initial payment of twenty per cent of the purchase price and the balance in eight equal monthly instalments. Practically all the stock sold under this plan has been marketed through the company's district managers and salesmen and the company has been paying them a commission of two dollars a share. Practically all the bond and stock issues of the company, however, have always been marketed through investment bankers and no effort made to dispose of them to consumers.

Northwest and Intermountain Companies

The Pacific Power & Light Company, which operates in Oregon, Washington and Idaho, has only two securities on the market, one a 5% First Mortgage Gold Bond and the other a 7% Cumulative Preferred stock. The stock sells at par and during the past two years about $250,000 worth of this security has been sold to customers and employes. All forms of advertising were used in the campaign including stuffers placed in the outgoing bills, folders, calendars, newspaper and magazine advertising and window displays. Customers and employes may purchase the stock on time payments, paying in ten instalments, and six per cent interest is given on all payments up to the time the transaction is completed.

The Washington Water Power Company has marketed most of its bond and common stock issues in the East, but recognizing the fact that it was desirable to have customers take part in the ownership of the company, arrangements were made with bond houses in Spokane to purchase the company's securities in the eastern markets for re-sale to customers of the company. The result of this has been that over twenty-six per cent of all the stockholders of the company are residents in the territories served by the company.

The Idaho Power Company has a 7% Cumulative Preferred stock which it is selling at par to its customers and employes through its employes without making a special campaign. This is accomplished by offering commissions to the employes selling the stock, and twice a month sales letters are sent to the employes to keep their interest aroused. In selling for cash the employe receives a commission of $3.00 for any one sale up to four shares and $5.00 for any one sale of five shares and then fifty cents a share on any one sale in excess of five shares. On the time payment basis the company sells the stock for ten dollars down and ten dollars a month, paying six per cent interest on the payments. On this kind of sale the employe receives a commission of $2.00 a share on any sale up to four shares, four dollars on any one sale of five shares, and fifty cents a share for any sale in excess of five shares.

In its advertising the Idaho Power Company has endeavored to bring out the development work that it is doing in the state and to get the people in the state interested in this development work by buying the Preferred stock of the company. Bill stuffers with return post cards have furnished a large number of prospects, as have the coupon attached to the newspaper advertisements. Upon receipt of this coupon the company immediately sends out a personal letter and a folder containing all of the particulars regarding the company and the stock, and a map of the territory served by the company. This prospect is then turned over to one of the salesmen in the territory from which the coupon came. The result of this has been that over fifty-five per cent of the holders of the company's Preferred stock reside in the territory served by the company.

This is how the Pacific Power and Light Company put over their recent stock campaign

Riverside Avenue, in the heart of the business district of Spokane, Washington, is shown on the left. Down River Drive, one of the beautiful motor roads in Spokane, is shown above. This city which will be the hostess of the Northwest Electric and Power Association, September 8-11, is the distributing and financial center for a territory of approximately 400,000 square miles and with a population of nearly 3,000,000.

The Spokane Convention

(The thirteenth annual convention of the Northwest Electric Light and Power Association which is to be held in Spokane from September 8th to 11th inclusive will be of interest to the entire Pacific Coast. A comprehensive program has been arranged, the details of which are given in this article.—The Editor.)

The thirteenth annual convention of the Northwest Electric Light and Power Association will be held in Spokane, September 8-11 inclusive, at the famous Davenport Hotel with an anticipated attendance of 250 members. An entertainment program is now being worked out by a local committee headed by W. E. Coman, vice-president and general manager of the Washington Water Power Company. Special arrangements will be made to provide for the ladies and everybody attending will be given opportunity to visit the Interstate Fair, then in progress.

President J. B. Fisken and Secretary L. A. Lewis, both of the Washington Water Power Company, Spokane, have prepared a program for the convention proper which is not yet complete as to speakers.

Martin Insull of Chicago, president of the National Electric Light Association, and M. H. Aylesworth of New York, secretary of that organization, have been invited to attend.

A feature of the convention will be the meeting at the same time of the new committee on hydraulic power. Those members of the committee who are expected to be present are Markham Cheever of Salt Lake City, chairman; J. B. Fisken and B. M. Merritt of Spokane; H. H. Schoolfield of Portland, Oregon; G. C. Sears of Seattle; H. A. Barre, Los Angeles; J. P. Jollyman, San Francisco, and C. O. Poole, Riverside, California.

The program as it now stands is as follows:

Wednesday: Reports and president's address, J. B. Fisken, 2 p.m. Report of the Accounting Section, J. S. Simpson, chairman, 3 p.m. Review of N. E. L. A. range and water heater report, A. C. McMicken.

Thursday: Report of hydro-electrical and technical section, Geo. Quinan, 2 p.m. Discussion of hydro-electrical and technical report safety reports.

Friday: Report of advisory committee on "Co-operation of Electrical Interests," R. J. Clark, chairman advisory committee, 2 p.m. Public Utilities Competition, Geo. L. Myers, Public Relations Section, 3 p.m. "Successful Public Utility Management of the Future," Franklin T. Griffith.

Wednesday noon an address will be made by an official of the N. E. L. A. before the Spokane Advertising Men's Club.

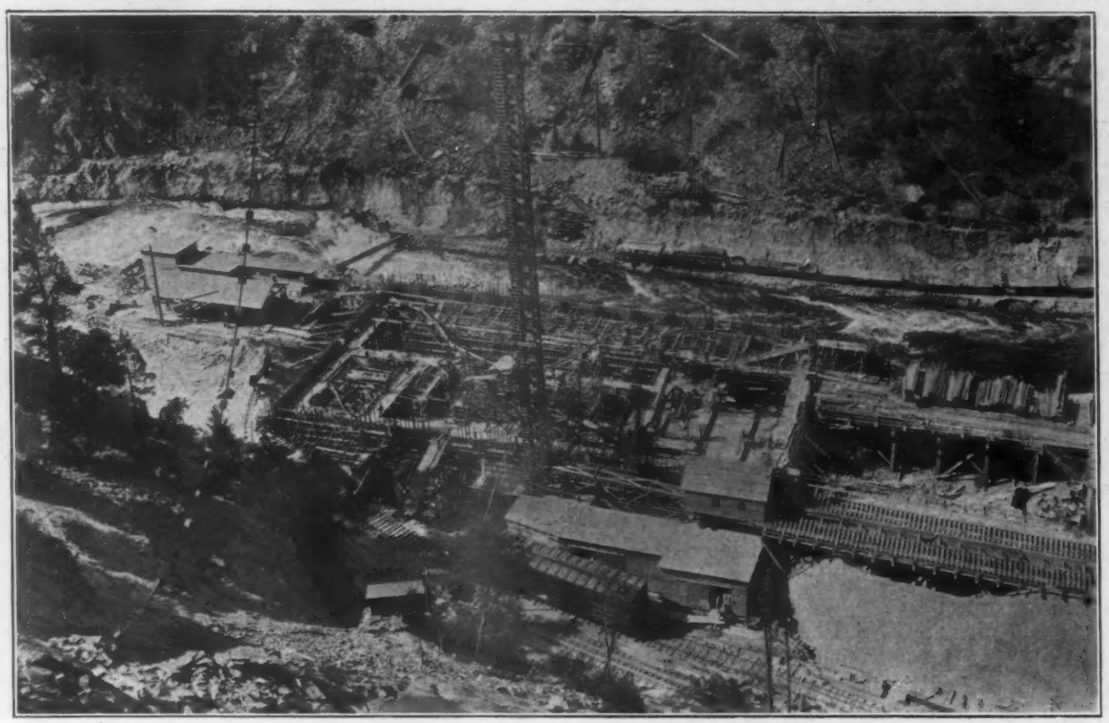
Thursday night an open address will be made the citizens of Spokane on some public utility subject, and Friday night the annual banquet will be at the Davenport Hotel. Saturday there will be competition for the Kilowatt Golf Club cup at Hayden Lake.

It is rumored that many plans are being made to entertain visiting delegates with the aid of near-by mountain drives and lakes and beautiful municipal parks and golf links. Within a hundred-mile radius of the city over 60 mountain lakes offer splendid accommodations and the best of hunting, fishing, bathing and boating. In a few hours by motor, one can be transported into the untouched wildernesses.

Forestalling Another Power Shortage

Digging new channel for North Fork of Feather River to allow Caribou plant to be built in old channel

By the fall of this year the Great Western Power Company of California will have installed 185 miles of the highest voltage transmission line in the world, extending 190 miles from Caribou on the north fork of the Feather River to San Francisco. The first two units of the Caribou plant, the second plant on the system, will be put into operation early in 1921, and will bring the total capacity of the system up to 139,500 kw. The ultimate installed capacity of Caribou will be 120,000 kw. The estimated expenditure required to complete the development of the river by means of a chain of seven power houses, amounts to about $76,200,000, some $10,674,900 of this being estimated as the cost of the Caribou plant and transmission lines. To defray some of this expense the company has recently been authorized to issue $3,500,000.00 of 8% ten-year bonds.



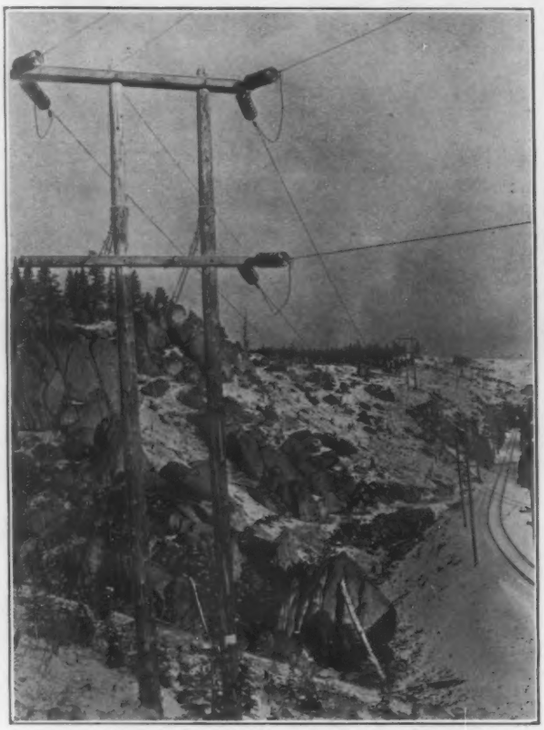
View of the Caribou plant of the Great Western Power Company, from the hill behind the power house.

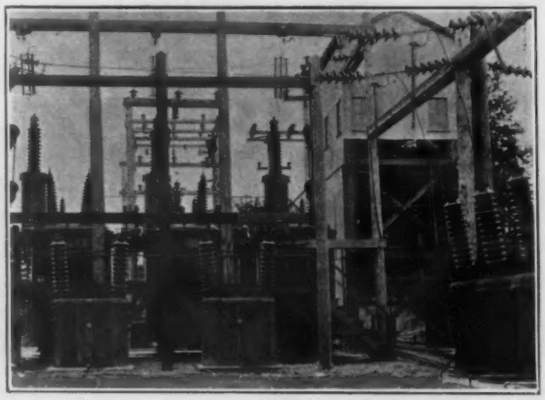
Starting the Shaver Lake Tunnel on the Big Creek System of the Southern California Edison Company. This will connect Shaver Lake with Huntington Lake through Big Creek power house No. 5, and will involve tunneling through 5.75 miles of solid rock. Power house No. 5 will be developed to an ultimate capacity of 100,000 hp. under a head of 1480 ft.

Vestal substation on the Southern California Edison Company's system. The company's generation program for the next ten years involves an addition of 472,000 kw. hydro and 60,000 kw. steam to its existing capacity, and plans are under way to convert the transmission lines of the Big Creek System from 150,000 to 220,000 volts, thereby doubling their capacity to transmit load.

Interior of the Kerckhoff power house, San Joaquin Light & Power Corporation, showing No. 1 unit completed and units Nos. 2 and 3 under way. These were completed in record time, and placed in operation August 15th of this year. The present capacity of the plant is 30,000 kw. and it will be connected with the McKittrick substation by 110,000-volt transmission lines.

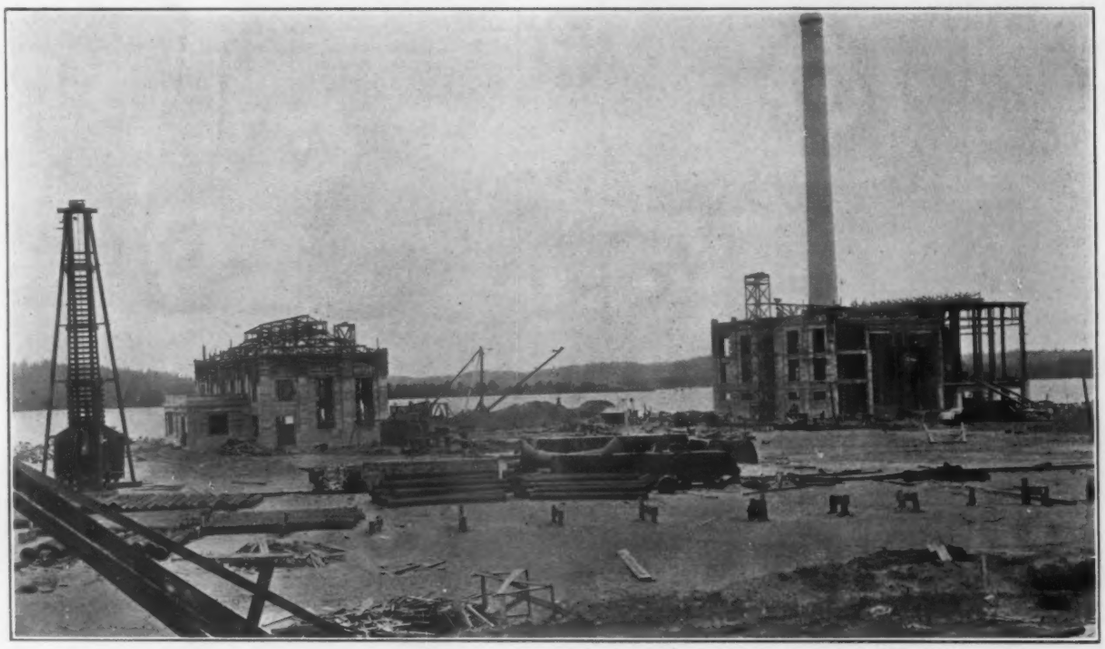
Removing rock from the tunnel line on the San Joaquin Light & Power Corporation's Kerckhoff project. This tunnel which was one of the notable features of the construction work, measures 18 ft. by 18 ft. and extends a distance of 3½ miles through solid granite. A steam shovel was used inside the tunnel, and electric storage battery locomotives carried out the burrowings.





The view above shows an outdoor substation at Snoqualmie, Washington, on the recently interconnected system which supplies power to the Chicago, Milwaukee & St. Paul Railroad. The work on this interconnection of the systems of the Washington Water Power Company, the Pacific Power & Light Company, and the Puget Sound Traction Light & Power Company occupied two years, and necessitated among other things the building of numerous substations to change the 100,000-volt current to 3,000-volt d.c. for the locomotives.

At the left is shown the construction on the 100,000-volt transmission line of the Chicago, Milwaukee & St. Paul Railroad sixteen miles east of Butte, Montana. The span here is 675 ft., and the photograph shows the method of guying and dead ending at corner points.



View showing progress being made on the construction of the Pacific Power & Light Company's new gas and steam electric generating station located at Youngs Bay, Astoria, Ore. This is to be a reinforced concrete building 90 ft. by 111 ft. by 50 ft. high, with a stack 220 ft. high and 10 ft. in diameter at the top. It is expected to be completed by October of this year, and will have a generating capacity of 3750 kva.

The Spread of the Cooperative Idea

(One of the most significant features of the California Electrical Cooperative Campaign, next to its success in its own territory, is the manner in which its fundamental idea is spreading throughout the Pacific Coast states and leading to the formation of new cooperative societies. Some account of this is given below, together with a few recommendations compiled by the California Campaign.—The Editor.)

One of the questions of importance to be taken up at the coming convention of the Northwest Electric Light and Power Association, September 8-11, is the formation of an Electrical Cooperative Campaign similar to that now operating in California. The success of the California movement has already inspired similar activities in Salt Lake City, and across the Canadian border.

British Columbia Electrical Cooperative Association

For the purpose of promoting electrical development and the more extensive sale and use of electrical appliances, the British Columbia Electrical Cooperative Association has been formed at Vancouver, B. C. Preliminary meetings have been held of the leaders of the movement and a general rally of all the men in the industry around Vancouver has been called for a date early in September.

The president of the association is George Kidd, general manager of the British Columbia Electric Railway Company, and its vice-presidents are R. F. Hayward, general manager of the Western Power Company of Canada, W. G. Murrin, assistant general manager, British Columbia Electric Railway Company, and William McNeill, assistant general manager, Western Power Company.

There is also an advisory council composed of E. E. Walker, sales engineer, British Columbia Electric Railway Company; E. Brettell, president of the British Columbia Association of Electrical Dealers and Contractors; J. R. Read, local manager, Canadian Westinghouse Company; H. Pim, local manager, Canadian General Electric Company; J. F. Little, local manager, Northern Electric Company; James Lightbody, publicity manager, British Columbia Electric Railway Company; W. W. Fraser, electrical contractor; S. E. Jarvis, Jarvis Electric Company; F. T. Cope, F. T. Cope and Son, and E. B. Horsman, Horsman & Company.

Of the advisory council E. E. Walker is chairman, E. Brettell vice-chairman, and James Lightbody honorary secretary-treasurer.

The association has been framed after the plan of the California Cooperative Campaign. The objects as set out in the constitution are:

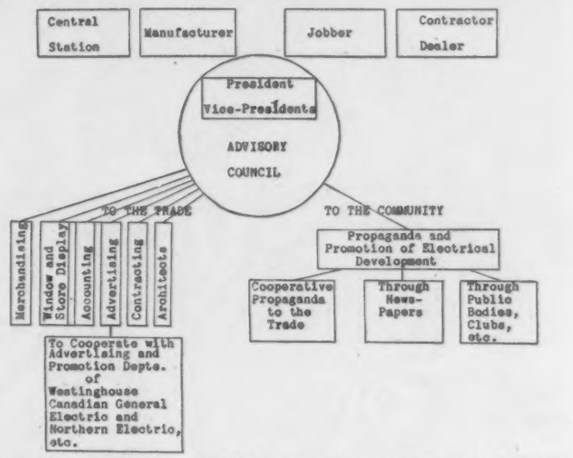
(a) To develop the electrical industry by educational methods, encouraging the practice of good ethical business methods and of improved service to the public.

(b) To develop a closer cooperation and understanding between central stations, contractor-dealers, manufacturers and jobbers, to the end that the efficiency of the various branches of the industry serving the public may be increased and that the customer may obtain better electrical service.

(c) To help the contractor-dealers improve their business methods, including accounting, sales advertising and general store appearance, thereby elevating the plane of the retail branch of the industry.

(d) To form a recognized body to promote electrical development in British Columbia, to support each branch of the industry when occasion requires and obtain fair treatment for invested capital on the part of the authorities by working for a fair attitude towards electrical development on the part of the public at large.

At a preliminary dinner given by George Kidd to the officers and members of the advisory council figures were produced to show that only a fraction of the business in electrical goods was being done that



The plan of organization which has been laid out by the British Columbia Electrical Cooperative Association

ought to be done on a basis of population. It was estimated that sales of electrical household devices alone amounted to only $200,000 a year, whereas on the basis of population they ought to amount to $427,000. Similar increases should take place in sales of other electrical goods, it was pointed out.

Owing to the limited territory it is not thought possible to engage paid experts at present and the advisory council proposes to use volunteer help from the larger companies operating in the district. It is hoped to take up the following definite lines: accounting, advertising, store and window display, proper merchandising, standard estimating, installation of more outlets, etc. Work will be done among the dealers, contractors and architects. The council will also urge manufacturers and jobbers to assist the dealers by the furnishing of advertising material and sales helps, and will urge the dealers to use such material.

While the beneficial effects will be felt largely by the electrical dealers and contractors, the manufacturers and the jobbers in increased sales, it is believed that the formation of the association will help the central stations to obtain fair treatment. With public prejudice operating against large central stations, it is probable that people will pay more attention to suggestions from business interests such as the electrical industry. At the same time, the tying-in of small electrical contractors and dealers with large central stations is expected to help their credit, give them better standing and improve the whole tone of the electrical business.

The British Columbia organization will endeavor to educate the contractor and dealer to help himself. It is not the intention of the association to conduct his business for him but to point out ways by which he may improve his service to the public and increase his own profits.

At the recent contractor-dealer convention in British Columbia the movement was emphasized in a speech by James Lightbody, publicity manager for the B. C. Electric Company, Vancouver.

"We must think of our business not in terms of more articles but as an idea—the electrical idea. That is what we have to get home to the public if we expect them to buy our goods. The idea has to be put across on a wholesale scale. The business in electrical devices has to be created out of nothing.

"The electrical business is not ready made. You must make it for yourself. It requires, therefore, the utmost care in the correct merchandising of your goods. It requires, moreover, the concerted efforts of all four factors in the industry. It is too big an idea to be put over by any one factor. It needs them all and it needs them all in cooperation.

The Electrical Supply Company, Ltd., of Vancouver, have one of the most attractive retail stores in western Canada. The owners state that "electric" and "service" are interchangeable terms in their vocabularies.

"The way each of you conducts your business instantly reflects upon the rest and vice versa. Poor advertising keeps back the whole industry. An untidy looking store makes the whole industry suffer. A smart store elevates the plane of all electrical merchandising. No man is a law unto himself in the electrical business any more than in ordinary life.

"Yet in propounding this doctrine we are not altruistic nor wholly selfish. It is all good business. The cooperative plan will put the electrical idea across in better shape and more quickly than any individual action.

"The manufacturers and jobbers and central stations all have men with organizing ability. The first moves must come from them. These companies should release men for no other purpose during the next year or two than organizing a cooperative movement in Vancouver."

Recommendations by the California Campaign

The Advisory Committee directing the California Electrical Cooperative Campaign has observed with interest the fact that other states are taking notice of the California idea and organizing movements similar to the California plan. It not only wishes to encourage the work, but is desirous of assisting so far as it can any of these movements, and with this end in view has prepared a bulletin with the following suggestions to supplement its regular reports:

1. We recommend to all cooperative organizations that they be supported by contribution from electrical firms and corporations rather than by appropriations from electrical associations. The contributions that we receive from the central stations, manufacturers and jobbers are all from the individual companies and corporations. The contractors and dealers contribute to our movement through their association, but we believe that even in the case of contractors and dealers it will be much more satisfactory to deal directly with the individuals. Movements similar to the California Electrical Cooperative Campaign are for the good of the entire electrical industry, have special missions to perform and should have no alliances that might in any way become entangling. The electrical associations in the territory should endorse the cooperative movement. In California the Pacific Coast Section of the N. E. L. A. from year to year passes a resolution endorsing our work and requests its members to renew their subscriptions to our fund.

2. Committees in charge of movements similar to ours should make their proceedings and activities informal rather than formal. We recommend neither a constitution nor by-laws. Experience has taught us that the problems of the electrical industry are constantly changing. We are dealing with problems today that were not contemplated or considered when our Campaign began. We feel that we have earned the confidence of the entire industry and are constantly receiving requests to undertake some new educational activity. We feel that a constitution and by-laws would have been a handicap to our work. In fact, we would probably have outlived our usefulness long ago if we had to conform to definite rules and regulations.

3. We recommend that an outline of policy be declared at the beginning, and that such policy be educational and not commercial. We analyzed problems of the industry in California and carefully wrote our declarations of policy before commencing any actual work. Statements of our policies will be found on pages 7, 8, 9, and 10 of our January, 1919, report and on page 3 of our January, 1920, report.

4. We would caution against proceeding too rapidly or attempting too much in the beginning. We proceeded slowly, feeling our way as we went, and this we believe has had much to do with the success of our Campaign. The first year of the Campaign in California was spent entirely in selling the cooperative idea. This was accomplished by dinner meetings and by our field men selling the cooperative idea before they attempted to any extent any other work. Even in the engaging of field men we proceeded with much caution. The duties of these field men are outlined in the reports of January, 1919, and January, 1920. As the work progressed an advertising representative was added to encourage and help the industry to tell its story through advertising and news items and to acquaint the newspaper editors and advertising managers with the possibilities and problems of the electrical industry. His duties are outlined in the January, 1920, report. The first of this last year an architectural representative was added to work with architects, builders and real estate men, explaining the advantages of adequate wiring and the necessity of providing a sufficient number of convenience outlets in homes. His duties are outlined in the January, 1920, report. Now the Campaign is ready to undertake educational work with industrials and establish lighting exhibits in San Francisco and Los Angeles. This illustrates how cautiously we proceeded and how normal has been the growth of the Campaign.

5. We have an unwritten law of undertaking no activity that has not the unanimous consent of all of our Committee. This has kept us from making any grave mistakes and from doing anything that might be detrimental to any branch of the industry and assuring us that our actions make for the good of the whole.

6. We recommend that the personnel of any committee similar to ours be changed as little as possible. It takes time for a man from one branch to grasp and understand the problems of the entire industry. Much useless discussion and going back over old ground can be avoided by a committee that is permanent in character, thus giving the committee more time for the discussion of constructive ideas and the actual solution of problems.

7. We never attempt to undertake any activity without the consent of the contributors. This we obtain by calling prominent men in various branches of the industry into our meetings and discussing the new problems with them. At all times we welcome their advice and any ideas that they may have to offer.

8. Contributors are kept informed of activities undertaken and results accomplished by monthly and yearly reports.

Contractor Dealers of the Northwest

(The advance in electrical retailing is one of the most marked features in the progress of the electrical industry. Below are interesting pictures of some of the up-to-date retail establishments in the Northwest which indicate the high standard of merchandising maintained by the contractor-dealer on the Pacific Coast.—The Editor.)

In the attractive store of F. A. Bauman & Company in Portland, washing machines and vacuum cleaners are conveniently placed for demonstration so that the customer who drops in to buy lamps does not have to make a special point of asking to inspect them. Notice the use of jewelers' cases for display, and the lamps of various types and intensities attached above the counter where they can be demonstrated easily.

A vista of display rooms opening one into another gives to the store of E. L. Wright & Company of Portland an air of distinction and spaciousness. This is enhanced by the tasteful arrangement of appliances on a long strip of plush at the left, and the general air of neatness in the entire display. Note the system of drawers at the right with a sample of the contents attached to the outside of each.

A polished table covered with a cloth provides a home-like setting for the table lamps displayed in the store of the Pierce Tomlinson Electric Company of Portland. Here also pamphlets invite the lingering customer. The counter is free of any kind of display, the smaller appliances being carefully ranged on shelves and in cases. The hanging fixtures are concentrated at the back of the store, leaving the walls and ceiling in the front clear.

Laying out a limited space to the best advantage necessitates a very skilful arrangement and absolute neatness. The Scott Electric Company of Portland has carefully distributed its heavier appliances, and made full use of all available shelf space to prevent crowding in show cases. Space economy is achieved also by locating the office department on a built-up "mezzanine floor."

Advertising

BY HOWARD W. ANGUS

(After you have bought your advertising space in the newspaper, what do you do with it? The preparation and placing of advertising copy are here taken up by the secretary of the California Electrical Cooperative Campaign in the third of a series of articles on electrical advertising.—The Editor.)

Having laid out your advertising program and schedule, the next point to consider is the preparation of your advertisement. Remember the four principles of salesmanship — attention, interest, desire, action. How are you going to secure them by your newspaper advertisement? First, your advertisement must be easy to read, therefore it should consist of plenty of white space so that the printed matter will stand out on the page like an island in a sea. If you fill it full of reading matter people will pass it by, because it is too hard to read. To get their interest it is necessary to have an illustration, and this illustration should be as large as your space will permit, because everybody's interest is aroused by pictures. These illustrations your manufacturers and jobbers will furnish you.

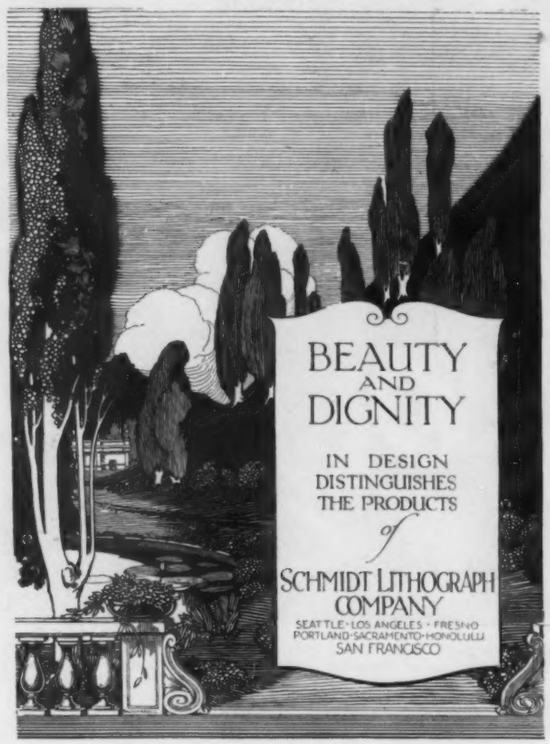
Now, how are you going to awaken their desire? Principally by having a short, brief, simple statement about the service the article will give the purchaser. Wrigley has said: "Say it briefly and keep saying it." Your statement should be in clear type that the eye may read it easily. Out of all this you want action, therefore be sure to have your name and your store location and telephone number in distinct and large type, that people may know where to buy. Those, in brief, are the cardinal points of an advertisement. Of course the larger your advertisement, the more unique its style, the more chances it has of being read.

Preparing Advertising Copy

Newspaper advertising is a business in itself. You should master it, or better still, have some advertising agency or expert prepare your copy under your direction. You should not employ an agency, however, and leave the entire advertising to the agency. You know more about your business than the agent does. He knows more about advertising than you do. Combine the two. Give him your ideas and allow him to put them into advertising form. One of San Francisco's large public service companies has been running some unusual advertisements. They are written in rough form by the company's publicity writer who has ideas and knows his own business and what he has to sell. When you hire a salesman you hire him for his ability to sell electrical goods. Unless he is efficient you do not keep him. Certainly you should be as particular about the man who writes your advertising copy, and take as much pains with it as possible. To have it written by an office boy or scratched off hurriedly at the last minute is the depth of poor business.

Where to Put a Newspaper Advertisement

Having prepared your copy you ought to know where it is to appear in the newspaper. The best location is in the upper right hand corner of the first page. Of course you cannot secure that position. No advertiser can. The next best location is in the upper right hand corner of any other page of the paper, especially on the odd numbered pages. That



An example of a dignified advertisement which sells the idea of possibilities in lithograph. Such an ad with a minimum of printing conveys a powerful message that will be remembered.

is where the eye naturally looks first. You should also pick your page. Next to the death column is not a good place for an advertisement, but contractor-dealers' advertisements have appeared there. The financial page is a poor page for an advertisement of any kind that is to go into the home, because few women read that page. It is a fine page, however, for an advertisement on industrial lighting, because business men and factory owners read it.

Before leaving newspaper advertising it might be well to explain the principles of the electrical page that is being promoted by the California Electrical Cooperative Campaign. People have acquired certain habits in reading newspapers, and the electrical page has been designed to fit in with those habits. The best way to illustrate what is meant is to consider how you read a newspaper. You read the first page always. After that you turn the newspaper over, scanning page after page until you come to something that interests you. As you scan the pages the big headlines across the top are certain to catch your eye. The electrical pages have a banner line that

states a fact about electricity, because we know that the majority of people will read that. As you look through the paper the next features that catch your eye are the pictures, therefore we try to get pictures on the electrical page. We are safe in saying that anybody who looks through a newspaper will at least

A solid electrical page which appeared in a Sunday paper. In a week day edition other news should appear on the page but on a Sunday the reader of the paper has more time and will usually give such a page plenty of attention.

catch the headline and the picture. After that the next thing you read are the stories. The last things you read are the advertisements, unless they fairly jump out of the page at you. Therefore, we have stories with headings to them in type large enough to catch the eye of the man who scans. These again state a fact about electric appliances and service. There is a danger that people once having read the electrical page may merely read the headlines and then pass it over. For that reason the newspapers have been encouraged to put real, live news stories on that page along with the electrical items, so that the public will dip into the page to read these stories and run across the electrical stories that are alongside of them; the idea being that the headlines, pictures and stories will sell the electrical idea and the readers will look at the advertisements to find where to buy. To give percentages, 95% of the readers of a newspaper will look at the headlines and illustrations, 50% will look at the big type at the head of the stories, over 15% will glance over at least one of the stories, 5% at least should look at the advertisements. So you see that inasmuch as in buying newspaper space you are buying readers, the advantage of the electrical section is a gain of from 20% to 90% in readers alone. The smaller the newspaper, the larger are all the percentages.

Stories on the goods that merchants sell are necessary. The automobile industry knows that and has stories. The theatrical industry knows that and has stories. The department stores know that and have stories. The society columns of the newspaper are their publicity—telling all about what women wear and how homes are furnished. That's why the electrical industry must have publicity.

An electrical contractor-dealer, especially in the smaller cities, should form the habit of dropping in to see the newspaper editor. If you have wired a home and fitted it complete with electric appliances, write a story about it and carry it to the newspaper. Some of the best known men in the United States are so well known today, because they have religiously performed their duty of carrying copy to newspaper editors.

The principal features of a newspaper story are to state all the important facts in the first sentence and in every other sentence state a fact or elaborate on the facts in the first sentence. The story can then be cut anywhere after the first sentence and still tell the public what you want said.

TALKING TO A NATION BY WIRELESS

"This is Hiram Percy Maxim speaking from the De Forest radio telephone station at the California Theater, with aerial from the Humboldt Savings Bank Building, San Francisco."

This opening remark and the entire address which followed it were heard by owners—chiefly amateurs—of radio receiving sets all over the western United States. The address was delivered on July 3rd in connection with the programs planned by the California Theater, and the idea of having the theater's Sunday morning concerts "distributed" by radiophone.

It is significant of the rapidly-growing interest in wireless that there are already some 300,000 amateur radio sets in the United States, the owners being organized into a flourishing body known as the American Radio Relay League, of which Mr. Maxim is president. Mr. Maxim said in part:

"No one of the great multitude of human efforts being made at the present day can compare in far-reaching effect with radio communication. * * * At the great convention in San Francisco it was evident to the observer that assemblages of people have come to be of such vast proportions that no human voice is strong enough to be heard by all those present. Radio was called upon and a microphone installed and connected to amplifiers high up in the arena."

Mr. Maxim went on to paint a picture of the extension of this idea, describing the possibility of radio sets and amplifiers located all over the country in such a way that millions of people could hear one speaker at the same time.

"No one would be too remote to be able to listen. All he would need would be a radio receiving outfit, and we amateurs and professionals know how simple and inexpensive this would be. No code need be learned, for the spoken word would be the signal instead of the dot and dash. * * * This thing has a world of possibilities back of it. It points to the possibility of conventions being held at which the entire country may take part."

The beginnings of these developments are already apparent in such plans as that mentioned above, by which the concerts held every Sunday morning at the California Theater would be transmitted to hearers with wireless receiving sets many miles away.

What Is the Business Outlook?

(How the present abnormal business situation, with its high prices for labor and materials, its restricted credit, affects the electrical industry is brought out in the following interesting compilation of letters from prominent electrical manufacturers, written in response to inquiries sent out by the Journal of Electricity.—The Editor.)

At the present time with the cost of living, building and all materials still on the increase, or at least maintaining their present inflated state, it is of great interest to know just how the large manufacturers feel about the present business outlook. Accordingly a number of them were consulted with the idea of securing some data that would prove of value to the rest of the industry. From the optimistic tone that prevails in all of their reports it is certain that the electrical industry is at the present time on a firm footing, with every indication that it will continue to be so and that the gradual recession of high prices will come slowly enough and with plenty of warning so that no one will be injured.

D. Hayes Murphy, American Wiremold Co. of Hartford, Conn., says: "The supply has increased somewhat and while the demand is still good it is not as urgent as during the spring and winter months. With the distinct shortage of most classes of buildings and all classes of railroad equipment, it seems reasonable to expect a long period of satisfactory business with occasional recessions for the adjustment of prices and credits."

That the Habirshaw Electric Cable Co. of New York are confident of the stability of business is shown by the following from J. Nelson Shreve: "We do not look for any changes at the present time in the price of copper. There is no heavy buying of copper now and the producers are not very anxious to sell. They expect the buying movement in August and look for an increase in price about then which we do not consider a justified expectation until the financial situation lets up, which we believe will be in the near future. Business continues on a very large scale here and we believe that it is going to keep up."

The manufacturer of conduit is optimistic as to the general business prospects in the electrical industry for the balance of the year, according to C. E. Corrigan, vice-president of the National Metal Molding Co., for the following reasons:

"1. Because of restricted production for the many reasons well known, there is no accumulated supply of products which we manufacture at any point—either at our plant, our warehouses, or in the stocks of our distributors or their customers. That the demand for electrical materials for the wiring of buildings will not decrease for the balance of the year appears to us certain, because from our observation the demand for the past several months of this year for these materials has been for smaller construction—building of residences, garages, repair work and factory extensions—but there is evidence present now of the starting up of erection of office buildings, hotel buildings, and such other structures as will rather increase than lessen the demand for electrical materials.

"2. There does not seem to be any indication at present of lowering of prices, because costs of production are not being lessened either on the item of labor or raw materials.

"3. The chief difficulty of manufacture today is the shortage of cars in which to make shipments and which cannot be relieved until new cars are built, which takes time. There is also difficulty in getting raw materials, which is largely attributable to the same cause, viz., shortage of cars in which to make shipments. Labor conditions are improving so far as the supply is concerned.

"In conclusion, we believe there is an increasing feeling of optimism among business men and manufacturers, and notwithstanding a large portion of the balance of the year covers a period of the presidential campaign, the major conditions point towards general improvement in all conditions that make for prosperity."

George A. Hughes, president of the Edison Electric Appliance Co., looks for a great expansion of the appliance business:

"We have been passing through a period of expansion of general business apparently greater than normal, and a period of contraction may naturally be expected.

"The readjustment of general business conditions, however, ought to prove of benefit to the electrical industry by releasing funds for investment in the central station field which is now suffering because of high money rates and stringency of the money market.

"We have reached a new age—the electric age—which involves our domestic habits. There is a tremendous potential demand for electrical appliances which properly directed sales activity will continue to turn into increasing actual demand; and the natural expansion of the appliance market will more than offset, in our judgment, the influence of any period of general business contraction."

The manufacturer of wiring devices states that "nothing short of an industrial catastrophe could by any possibility check the growth of the electrical industry." To go on quoting P. A. Powers, advertising manager, Benjamin Electric Manufacturing Co.:

"The electrical industry, particularly that concerning the manufacturers of industrial, household and farm lighting devices and appliances, is in an immature state of development. The possible market which can be stimulated exceeds at the present by several times the ability of electrical manufacturers to supply it. To those manufacturers who are developing lines of material for these markets the outlook is promising. Nothing short of an industrial catastrophe could by any possibility check growth. We do not expect industrial stagnation; quite the contrary. In our opinion, therefore, manufacturers should view the future with considerable confidence."

Another manufacturer of wiring devices, The Bryant Electric Co., has confidence in the future of the electrical wiring device business, as is shown by the statement by F. V. Burton, general manager of the company:

"I suppose it has never been so difficult as now to forecast the future of the wiring device market, or any other market, for that matter.

"In general, I think it can be said that it is entirely dependent on how the railroads solve their difficulties. We have plenty of unfilled orders and they continue to come in at least as fast as we can ship out. The demand for all kinds of buildings—and especially of living quarters— is so great that except for some adverse influence we feel that our demand will continue and increase. It takes more and more emergency efforts, however, to get raw material in and to get it to our distributors after we get it manufactured."

John J. Gibson, manager supply department, Westinghouse Electric & Manufacturing Co., one of the largest manufacturers of electrical equipment in the United States, has summed up the present condition of the electrical industry in a manner that leaves little doubt as to the future growth of that industry:

"It is very difficult to express an opinion just at this time without running the risk of being misunderstood. I believe everyone in the industry is an enthusiastic optimist on the future in general, but at the same time every observing man cannot fail to see that the present situation contains certain elements of uncertainty which will sooner or later result in business depression of a more or less temporary nature.

"As to the immediate conditions, the copper market is strong. This is evidenced by the lack of any appreciable effect on copper prices by the large quantity of copper which came recently on the market through second-hand channels, due to the Japanese financial trouble, which prevented copper exports to Japan, coupled with the inability of the exporters to finance the carrying of these large amounts thus thrown back on their hands.

"Costs are still pushing prices up. The volume of orders keeps up, but the percentage curve of increase this month over last month and this year over last year is flattening out.

"Lack of adequate transportation, tightness of money, and shortage of material, annoying and paralyzing as they are, may ultimately be found to have been blessings in disguise, for they are restraining influences which will prevent over-inflation which would be very disastrous.

"The volume of business in the smaller articles in the industry, particularly those things handled by electrical jobbers, depends upon two things—building operations, and the spending power of the great buying public. Building operations are falling off in volume, but the effect of this will not be felt for several months in the jobbing business.

"In the central station branch of the industry the demand for meters and transformers, particularly meters, is far beyond the combined capacity of manufacturers thereof.

"In the industrial field, in many industries manufacture is slowing down, notably in the textile and automobile trades.

"In the domestic field buying is still good and will remain so as long as people have money to spend. This will continue until there is unemployment. Here is where our educational campaigns may be counted upon to overcome any depressing causes due to general conditions, and those parts of the country fully electrified, of which California is the most conspicuous example, will probably feel no change at all.

"We may all congratulate ourselves on one thing, and that is that the electrical industry never feels any depressions as much as other industries. It is **the art conservative of all arts**—the industry of economy and saving, and the wonderful campaign of education which has been carried on by the electrical fraternity will keep electrical business always on the up-grade of growth and development. Also two general matters are strong factors in favor of electrical growth: one is the high cost of fuel, and the other is the fairer and ever more favorable attitude of the public towards public utilities. Ultimate success and profit are sure for every branch of the electrical industry."

H. A. Lewis, advertising director of the Electrical Trio, McGraw-Hill Co., has given his ideas on present business conditions as follows:

"At the present time the country is going through a period of credit deflation brought about by the action of the Federal Reserve Board, the action of the latter being a natural consequence of the twenty-six billion dollars' worth of government loans floated as a result of the war for which we have, as a nation, no physical assets to show. Based not only on conditions from the viewpoint of the electrical trade but also the automobile trade and other businesses, the question of restricted credit will be with us for some time, but by Fall the bankers will have eliminated many of the speculative commitments, particularly for commodities.

"Labor conditions at the present time have, in the judgment of certain thinking people, turned the corner for the better. The cost of living has reached its peak and as living prices will not go higher, neither will labor prices.

"Raw materials for electrical industry are tied up primarily by this question of transportation and no manufacturer can expect to see a smooth movement of raw materials, nor can any jobber or dealer expect to get stock regularly until well into the Fall or early Winter. Weather conditions this Fall and Winter will have a direct bearing on the movement of raw materials and finished products.

"There is no doubt that the consumer demand in many lines has softened. This applies particularly to household devices and also wiring material as a result of delayed building activities. Offsetting this, however, is the fact that we have no surplus stocks of either household devices or wiring supplies so that there will be some months before production and distribution will catch up to the so-called consumer demand.

"At the present time, the most optimistic single fact of the situation is the growing consciousness on the part of the consuming public that price cutting sales in the early summer were abortive. The public, as a whole, is beginning to see that there can be no drastic reduction in prices and such reductions which take place will come gradually and as a result of increased production. While in some lines abnormal profits have been made and large quantities of stocks held for speculative purposes, in the aggregate there is no surplus, so the prices have direct relationship to the cost of materials and cost of labor.

"The most outstanding factor which will help to soften the prices will be the importation of European and Japanese merchandise, because as the foreign countries increase their production, the rates of exchange as they exist today work very much in favor of the American importer.

"There was never a time in the history of American politics when the presidential election was as largely discounted as today. As a factor in general business, it has almost no bearing.

"In my personal judgment, we can expect a more optimistic tone in business this Fall, and I think the electrical industry particularly will have a decided revival of buying, particularly in those lines which are for general consumption."

The manufacturer of washing machines, vacuum cleaners and ironing machines has the brightest hopes for the future, as is shown by the following statements of Neil C. Hurley, president of the Hurley Machine Co., Chicago:

"A careful analysis shows us nothing but splendid business ahead in electrical labor saving devices for the home. There seems to be no let-up in the demand for washing machines, ironing machines and vacuum cleaners. Our shipments for the first six months of 1920 are 149% more than they were for the first six months of 1919.

"I think that Chicago is a rather typical market, and certainly business has been going ahead here at a rate exceeding the best business that we have known heretofore. Dealers who have a good window display and who keep the salesmen on their toes are still clamoring for merchandise that they cannot get. It is only in those towns where dealers let business take care of itself that it has fallen off.

"We have the same optimistic view of the future that we have held for the past fourteen years. We have not been wrong yet and we know that we are not wrong this time.

"We know that clothes must be washed, we know that there are no servants to wash them and we know that housewives are not going to do this work themselves. They are going to buy machines when machines are available, so we know that jobbers and dealers are going to continue to sell these products.

"We believe that the jobber and dealer who is not organizing properly and looking forward to this particular branch of his business is losing a wonderful opportunity.

"Here are some cold bare facts on the immigration of women into the United States since 1910:

1910	269,444
1914	370,594
1919	10,428

"Think of only 10,428 women servants having arrived in America in 1919. This was only one servant for every 2000 families. Think of one servant in a town of 10,000 inhabitants and you have some idea of the picture. While there was an improvement in immigration in January and February of this year, it is believed that this improvement has been counteracted by the return of thousands of people during the past few months.

"Then you must take into consideration the shortage of homes in the country. This applies to almost every city in the United States, large or small. It is going to take them from five to ten years to get anywhere near normal, and no matter how high-priced labor and material may be, people will find out by next year or the year after that it will be absolutely necessary for them to build homes, apartments, etc., to take care of the present householders.

"There has been a tightness of money that has made some people feel that business was going to get poor later on and prices would come down, and that they could not get money to pay for materials, etc. I took this matter up with several of the banks in Chicago and New York and they all told me they would furnish all the money that was necessary for any good going business and that no one need hesitate about going ahead because he was short of money.

"The president of one of the largest and most important banks in Chicago said: 'Bankers are going to see to it that legitimate manufacturers, jobbers and dealers have enough money to carry on business. There is going to be no tightness of money where straightforward business is concerned. Bankers do not like to make loans to individuals so that individuals may buy luxuries—both dress and household—or to speculate. Because bankers have stopped this sort of loaning the idea has gotten around that money is tight. But any regular business man can get money whenever he needs it.'

"That is the spirit which I have found existing among all bankers. The Federal Reserve Bank System has made panics almost impossible as long as the government itself has money. And there is no prospect of the government being out of money, as you know.

"We do not think that material will go much higher, but there is no chance for it to come down on account of the high cost of labor and we do not look for any reduction in labor this year or next. We believe as long as labor prices stay up the other prices will stay up accordingly.

"Labor-saving devices for the home should never be classed as luxuries. They are altogether different from automobiles, which people buy for pleasure, and things of that kind which they can get along without. It is impossible today for a well managed house not to have electric labor-savers in it. Besides the labor saved by a washing machine there is a saving on the clothes. The high price of linens and all washable goods have made the housewives more careful about saving them from wear. In the old days when linens were cheap they did not watch them very carefully and allowed washwomen to rub them to pieces on the washboard, but today they are taking into consideration that their linens will last from six to eight times longer if washed in a washing machine. This amounts to a great deal of money and in fact will pay for a washing machine in a very short time.

"The whole world is short of goods and material and it will take years to replace what was lost. We could sell our entire output in England if we wished to ship it abroad. The American Exchange National Bank in their report of July 1, 1920, say that the foreign demand for American goods as revealed in the report of the Secretary of Commerce for May shows no sign of abatement.

"This is not a good time for any of us to feel that there is going to be a let-up in business along the lines we manufacture. I hope that none of the jobbers will feel that they should not go ahead stronger than ever in organizing their dealers and having them push these labor-saving devices as they should.

"But the dealers and jobbers who are going to get the most out of this good business, which is bound to remain with us, can do so only by using their foresight, anticipating the demand and ordering months in advance."

COMING CONVENTIONS

Are you considering—

The Northwest Electric Light and Power Association Convention?

Parties are being made up at various points along the Pacific Coast to attend this thirteenth annual convention of the Association, which is to be held in Spokane, Washington, September 8-11.

The program is given on another page of this issue of the Journal of Electricity.

State Chapters of the American Association of Engineers —

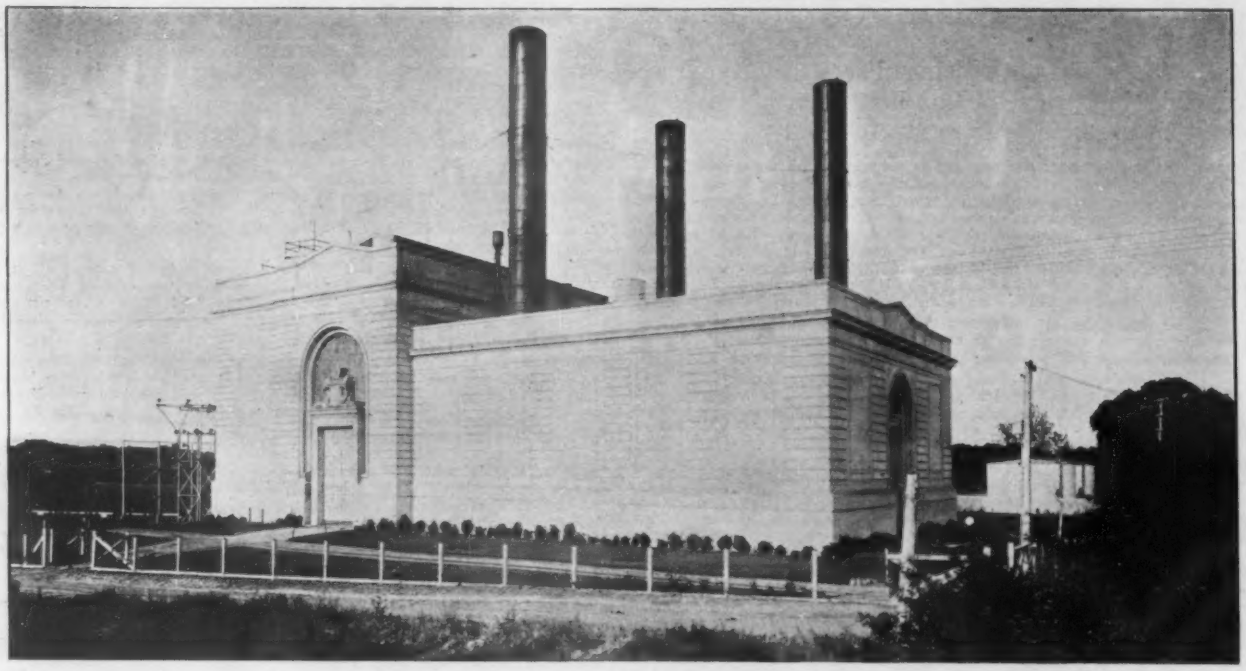
Everett, Washington, August 24

National Association of Electrical Contractors and Dealers —

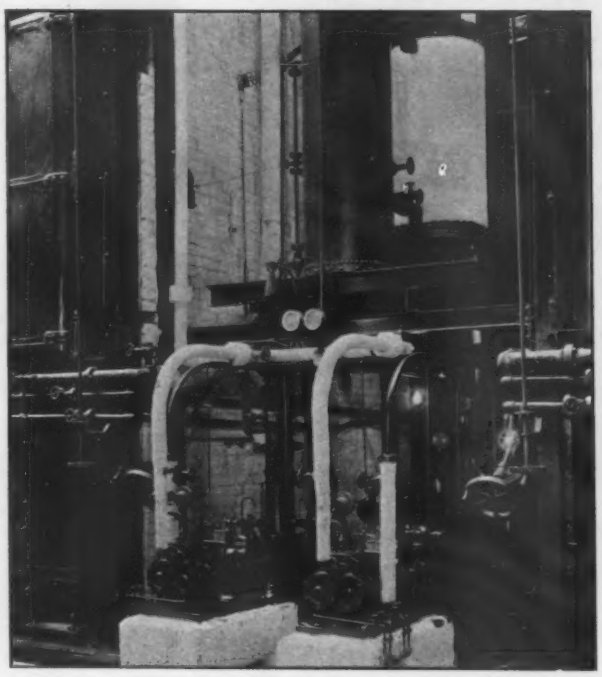
Baltimore, Maryland, October 4-9

Features of Steam Power Plant Practice in the West

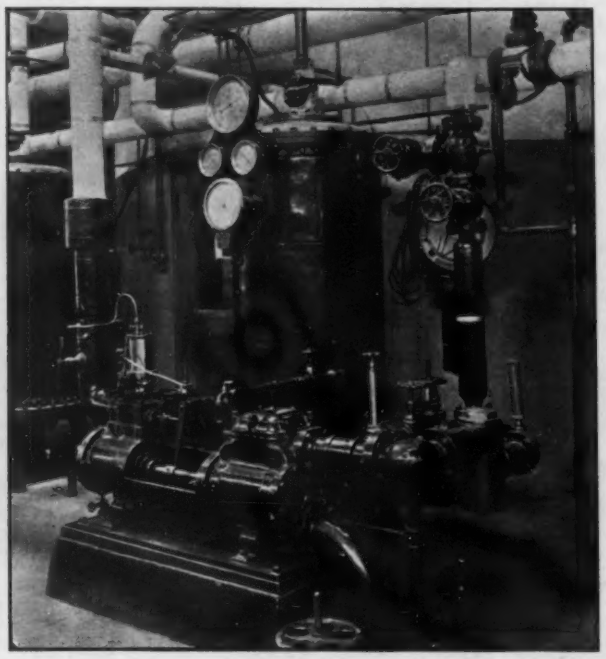
(The rising costs of fuel oil demand each day closer inspection in steam power plant operation in the West, and bring forth an insistent call for increasing economies in steam generation. Here are some views that show interesting features in recent steam power plant installations which are making possible the unusual economies brought out in the West in installations of this nature.—The Editor.)



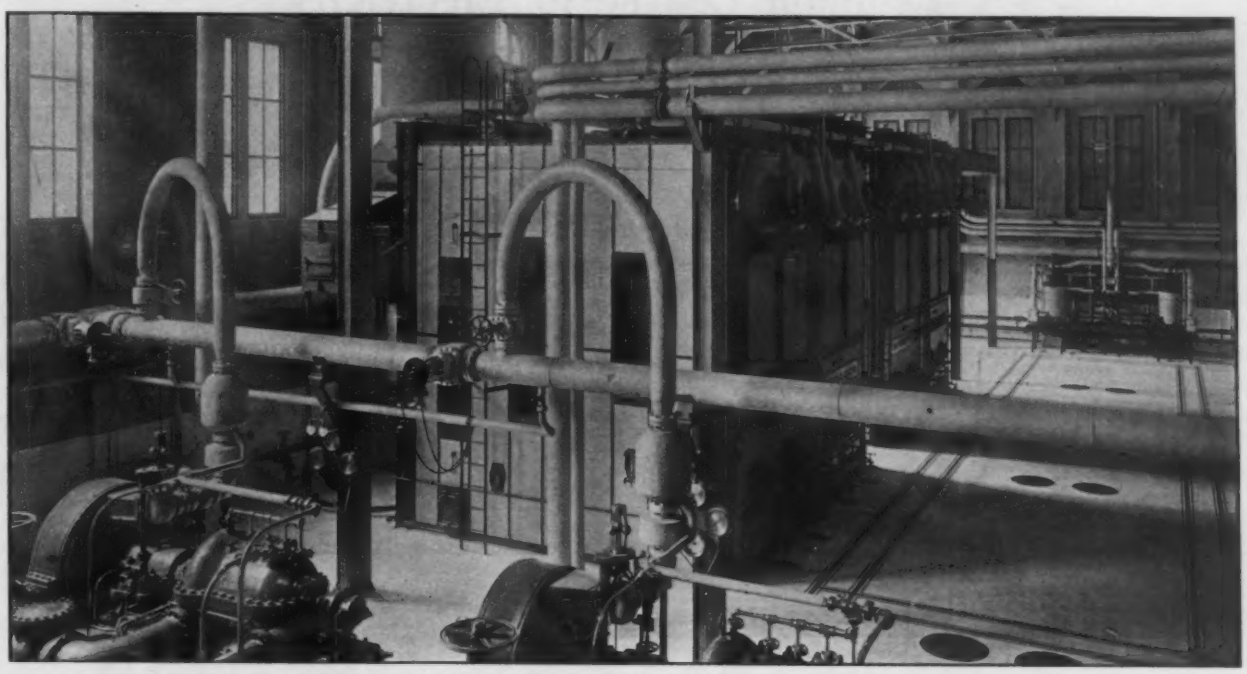
5,000-kw. steam turbine station, oil burning, Pacific Gas & Electric Co., Sacramento, California. Standby plants of this nature viewed in connection with hydroelectric network afford unusual opportunities for aesthetic design in exterior, as shown in this view.



Fuel oil pumps and heaters, Pacific Gas & Electric Company, Station C, Oakland. Below are shown the duplicate reciprocating fuel oil pumps. Above is a large air receiver and a coil pipe oil heater.

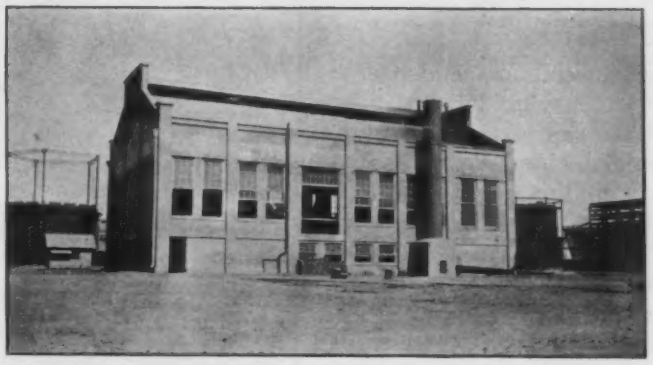


One unit of a duplicate set in the Long Beach steam plant of the Southern California Edison Company, consisting of a fuel oil pump in the foreground with the oil heater immediately behind it.

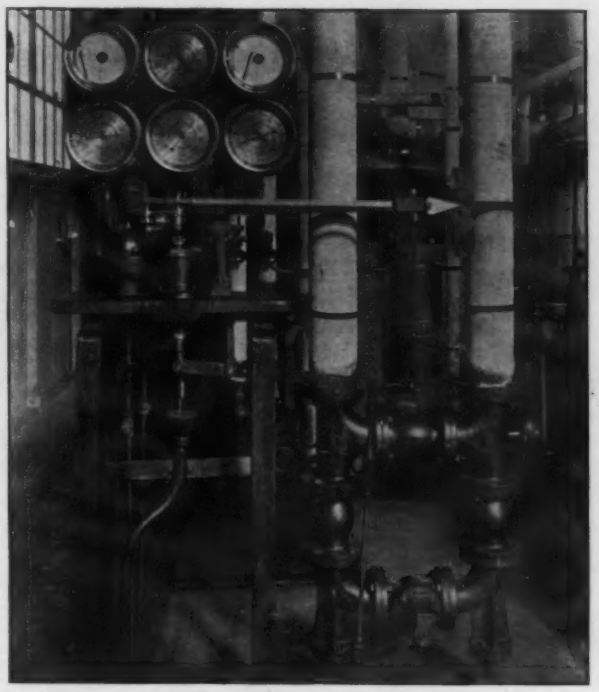


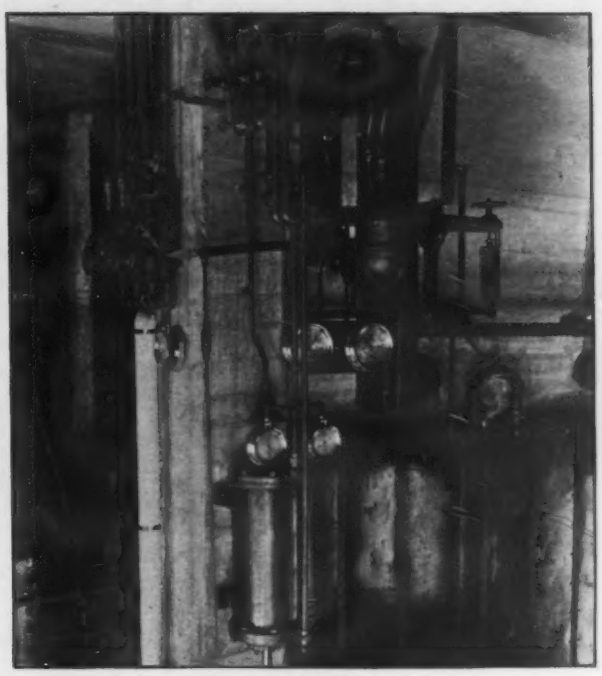
Above: High pressure pumping station of the San Francisco Fire Department. This plant is designed for standby operation and is at all times ready to prevent another fire of the magnitude of that which swept San Francisco in 1906. A feature of installations of this type is that they are one-man plants.

Exterior view of San Bernardino Plant of Southern Sierras Power Company where artificial draft is employed is shown to the right.



Below to the left may be observed oil-to-burner Mocre regulator controlling the steam pressure and the oil pressure, while on the right may be seen the damper controller that works by hydraulic actuation at the Arizona Power Company, Phoenix, Arizona.





Problem Course in Electricity

BY H. H. BLISS

(In the ordinary applications of electric power practically all devices are connected in multiple. This paper, the fourth in this series on practical electricity, deals with the difficulties found in calculating volts, amperes and ohms in these circuits. Answers to the problems will be published in the next issue of the Journal of Electricity.—The Editor.)

MULTIPLE CIRCUITS

Division of Current.—When an electric current comes to a point where the circuit splits into two or more branches, the current divides, part flowing in each branch, to be reunited at the next junction. The branches are said to be "in parallel" or "in multiple" with each other, and any one is called a "shunt" with reference to the others.

This discussion deals with circuits carrying direct current. Alternating currents obey the same

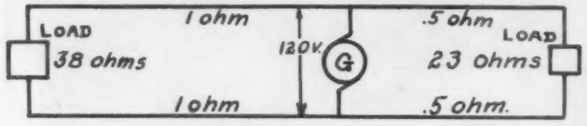


Fig. A

In this diagram a generator is shown impressing 120 volts on two parallel circuits, one of 40 ohms and the other of 24 ohms.

laws unless the circuits contain coils or condensers; hence the lamps and heaters considered below may be supplied with either direct or alternating current.

In calculating with divided circuits one has to keep in mind Ohm's Law and the following three facts: The total current is the sum of the branch currents; the pressure is the same across all the branches with the same terminals; the resistance to the current is less when it can divide and flow through several paths than when it is confined to one of them.

To determine the amperes in any branch, one simply divides the pressure across it by the resistance of that branch. In Fig. A, for example, the generator impresses 120 volts on two parallel circuits, one of 40 ohms and the other of 24 ohms. Currents are respectively $120/40 = 3$, and $120/24 = 5$ amperes. The generator evidently supplies a total of 8 amperes.

Equivalent Resistance. — This is the current which 120 volts would send through a single resistance of 15 ohms ($120/8 = 15$), and hence we may say that the "equivalent resistance" of the two parallel branches is 15 ohms. There are several ways to calculate the equivalent resistance of parallel resistances, all giving the same answer:

(1) Divide the actual voltage across the branches by the resistances, thus determining the respective currents. Add these, and divide the voltage by the combined current. (This method used above.)

(2) Instead of using the actual voltage, assume any voltage that seems convenient—generally one volt is selected. Then proceed as above. For the example of the 40 and 24 ohms the currents are $1/40 = .0350$ and $1/24 = .0417$ ampere; sum $= .0667$ ampere. Resistance $= 1/.0667 =$ **15 ohms.**

(3) Use the rule: "Equivalent resistance = product of separate resistances divided by their sum." With this example the rule gives $40 \times 24/64 =$ **15 ohms.**

(4) Draw, at any convenient distance apart, two parallel vertical lines whose length represents (to some scale) the separate resistances. Draw dotted lines from the top of each to the foot of the other. A vertical dropped to the base line from the intersection of the dotted lines indicates (to the same scale) the number of ohms of equivalent resistance. Fig. B shows the construction for 4 ohms and 12 ohms in multiple. Here 1/4 of the length of the line at the right represents 1 ohm, and the resulting vertical has a length of three of these units. Hence the answer is **3 ohms.**

(5) The quickest way is to use an "alignment chart" such as that in Fig. C. For instance, with 4 and 12 ohms in multiple hold a straight edge from the mark "4" on one of the outer lines to the mark "12" on the other. The equivalent resistance is read at the crossing of the center line as **3 ohms.** With this chart it is sometimes necessary to read between the marks; for instance, with 2.3 ohms in parallel

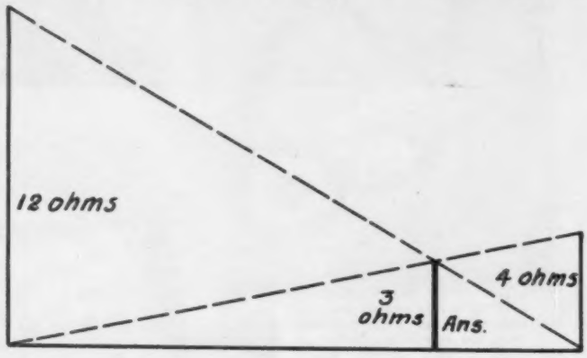


Fig. B.

The above shows how the equivalent resistance of parallel resistances may be found by constructing right triangles to represent the parallel circuits and then dropping a vertical line from the point of their intersection.

with 3.7 ohms, the answer (1.42) requires some estimating of spaces by eye. For large numbers, as 24 and 40 ohms in multiple, it is best to divide mentally by 10 and get the answer for 2.4 and 4 ohms (1.5 from the chart), and then multiply mentally by 10, getting **15 ohms** as the equivalent resistance.

Three or More Branches.—Imagine a 120-volt generator feeding three parallel circuits, of 12, 20 and 30 ohms respectively. What is the combined resistance? The currents are 10, 6 and 4 amperes; total = 20. Equivalent resistance = volts applied ÷ total current = $120/20 = 6$ ohms.

The same result is obtained by assuming 1 volt applied and proceeding according to method 2. With any of the other methods it is necessary to figure with two of the resistances, and then to combine this result with the third resistance. For example, using the fifth scheme, get the combined resistance of 20 and 30 ohms (2 and 3 in parallel give 1.2 hence 20 and 30 give 12 ohms), and combine this with the third resistance (12 ohms), finally arriving at the answer, **6 ohms.**

Equal Resistances.—If two 60 ohm lamps are in multiple, their combined resistance is found by any

one of the five methods to be exactly half of 60, or 30 ohms. If three are in parallel, the equivalent resistance is 1/3 of 60, or 20 ohms. Four in parallel are found to give 15, five in parallel 12, etc. In general the equivalent resistance of any number of equal resistances connected in multiple is equal to the ohms of one divided by the number of parallel branches.

Solutions of Series Circuit Problems

23. Ohms per foot = **.103**; for 670 ft., 670 × .103 = **69 ohms.**

24. Each lamp carries **6.6 amperes.** Each has a resistance of 37/6.6 = **5.6 ohms**; 50 have 280 ohms. The circuit has 1880/6.6 = 285 ohms; hence the line has a total of **5 ohms.**

25. Ohms in 230 ft. = 4/8.7 = .46; ohms per ft. = .46/230 = .002; ohms per 1000 ft. = **2.0.**

26. Total resistance needed = 215/6.7 = 32.1 ohms. 32.1 — 8.5 = **23.6 ohms,** which must be put in series.

27. Current = 218/(202 + 475) = .322 amp. Volts across first lamp = .322 × 202 = **65**; across other = **153.** The first lamp will be very dim; the other very bright, soon burning out.

29. Line resistance = 50/67.2 = .744 ohm. Then .744/.248 = 3, indicating 3000 ft. of wire. Distance = **1500 ft.**

30. Resistance in shaft (2 wires) = 1.4 × .02 = .028; of trolley wire ohms = 1.6 × .05 = .080; of track = 1.6 × .01 = .016; total ohms between generator and train = .124. Drop × 130 × .124 = 16.1 volts; generator volts = **230.1.**

31. Current = .021 ampere; drop in lamps = **10.5 volts**; **105 volts applied to man.** Note that .1 ampere may be dangerous and .25 ampere fatal. One's best protection from shock is in the resistance of dry skin; lamps, fuses, etc., are no protection.

32. Resistance = 4 volts/140 amperes = **.0286 ohm.** Drop at 30 and 200 amperes = .86 and 5.72 respectively, hence voltages required are **116.86** and **121.72.**

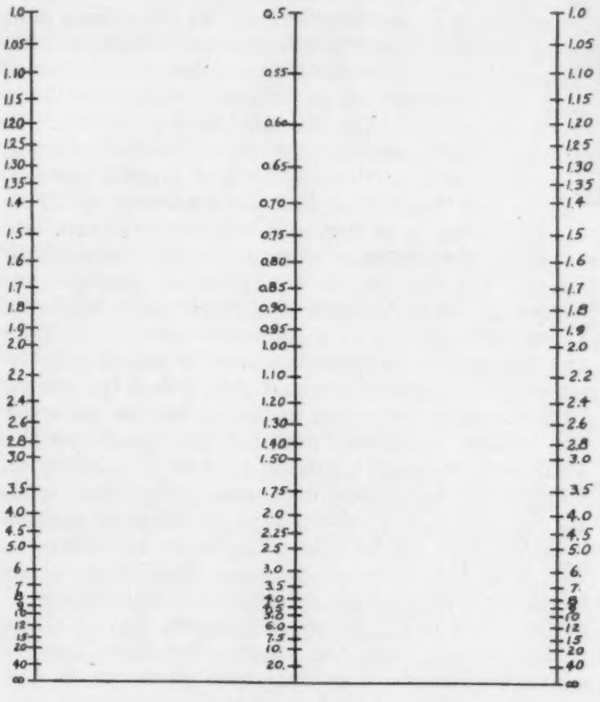


Fig. C

The quickest way of finding the equivalent resistance of parallel resistances is to use an "alignment chart" such as the one shown above. A straight edge is held so as to pass through the points representing the two parallel resistances as marked on the two outer columns. This will pass through a point on the middle column representing the equivalent resistance.

Problems on Multiple Circuits

33. A 92 ohm lamp is in multiple with a 24 ohm heater. If the lamp takes a current of 1.25 amperes, what current flows in the line?

34. In a single lighting fixture used on a 110 volt circuit there are five 25 watt lamps in parallel. Each has 485 ohms. What is the equivalent resistance of the group, and what current comes to it?

35. An ammeter of .01 ohm resistance has a "shunt" of .0025 ohm connected in multiple with it. What is the combined resistance, and what is the current in the line when the meter carries 12 amperes?

36. Two coils, of 7 and 29 ohms respectively, are connected in series, and the pair is shunted by a third coil of 18 ohms. What is the current in the line when the 7 ohm coil takes 2.5 amperes?

37. Three coils in a curtain heater are in multiple; coil A has 30 ohms and takes a current of 3.6 amperes; coil B has 24 ohms and coil C takes 2.7 amperes. Find total current and the equivalent resistance.

38. Two lamps in parallel take a total of 3.6 amperes at 108 volts, one lamp getting 2.1 amperes. The line wires between the generator and the lamps have .8 ohm resistance each. Find the current in the second lamp and the generator voltage.

39. What is the resistance of each of the lamps of Prob. 38? What is the resistance of the entire circuit outside the generator?

40. An electric locomotive taking 130 amperes is fed through a trolley wire 1500 ft. long which has a parallel feeder of equal length. The resistances are respectively .062 and .030 ohm per thousand feet. The return circuit (track) has .014 ohm per thousand feet. What is the voltage drop between generator and locomotive?

41. Lamps A and B of 160 ohms each are connected in series across a 120 volt circuit. A voltmeter is connected to the terminals of lamp B. What does it read? What does the reading become if a third lamp (160 ohms) is connected in multiple with lamp A?

42. A 220 volt heater, which takes 4 amperes on "high heat," 2.75 on "medium" and .86 on "low heat," has but two coils, one of which is used alone for the medium heat. Explain the connection for "high" and "low," and calculate resistances of both coils.

43. An electromagnet (16 ohms) and an electric toaster (35 ohms) are connected in multiple, and a resistance grid (4 ohms) is in series with the pair. An electric heater of 22.5 ohms is connected in shunt across the rest of the apparatus. Find the equivalent resistance of the whole combination.

44. At a telephone central office an operator's lamp circuit contains the following articles, all in series: A 24 volt battery, a lamp, a resistance coil of 83 ohms and a relay coil of 37 ohms. What is the lamp resistance if it takes .1 ampere? Find the circuit resistance (outside the battery) when a 40 ohm shunt is connected in multiple with the lamp.

45. A man whose body resistance is 6000 ohms connects three 1200 ohm lamps in series across a 221-volt circuit. To get a medicinal shock he connects himself in multiple with the center lamp. What current flows through him? What if the center lamp burns out while he is enjoying his shock?

ELECTRIC WIRE TO BE MANUFACTURED IN JAPAN ACCORDING TO NEW STANDARDS

Ten leading electric wire manufacturing concerns in Japan, according to an issue of the Trans-Pacific, have recently issued a joint statement to the effect that they have completed their preparations for the production of insulated electric wires and cords to meet the official standards published last October. The manufacture of the old type wires and cords which have until this time been used in Japan will now be discontinued.

Mechanical Analogs—II.

BY G. R. SCHUCK

(The second of the series of mechanical analogs, by a member of the electrical engineering department of the University of Washington, takes up the parallel pressure and flow processes of mechanical and electrical circuits.—The Editor.)

RESISTANCE, CAPACITY AND INDUCTANCE IN PARALLEL

In the system shown in Fig. 3, T and T_1, are tanks connected by pipes to a cylinder K which contains a piston oscillating as does the piston of a steam engine. Connected as shown in the figure is a cylindrical vessel (C) divided into two parts, A and B, by an elastic partition M made of rubber, or some other elastic material. L is a similar vessel with the exception that the partition D is a massive piston free to move to the right or left without appreciable friction and having much inertia. R is a small pipe having long length and small cross section area. Valves are inserted in the pipes W, W_2, and R. The whole system, including only half the tanks T and T_1, is filled with some incompressible fluid without inertia. The upper halves of the tanks and the piston are filled with some incompressible gas, such as air.

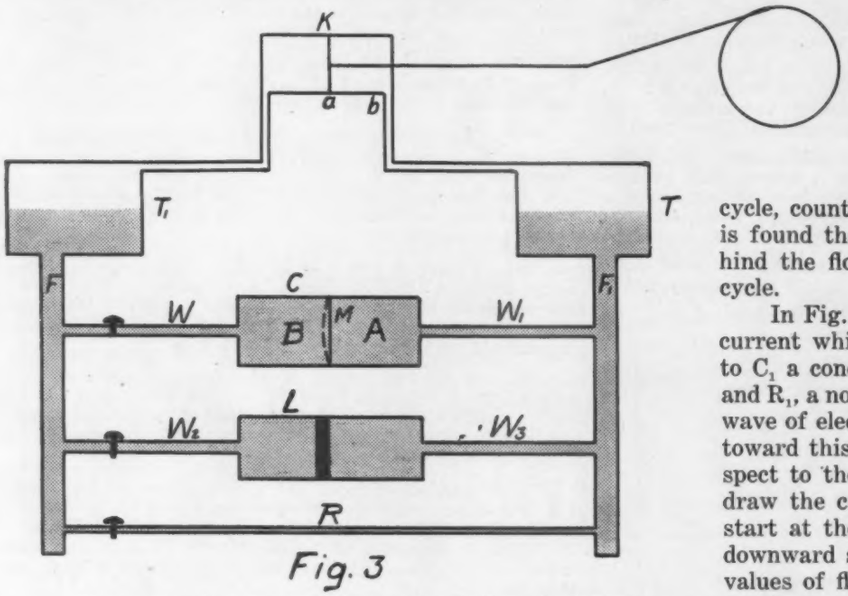


Fig. 3

Diagram of mechanical equipment to illustrate relation of pressure to flow.

When the piston in cylinder K oscillates back and forth, there is produced a difference of pressure in the two tanks T and T_1, first in one direction, then in another. The curve of pressure for one complete cycle of the piston is represented by E in Fig. 4, time is counted from left to right. That portion of the curve above the line represents the excess of pressure in tank T and the lower portion of the curve the excess in pressure in T_1. With all other valves closed, open the two which connect to vessel (C). When the piston is moving from position (a) to the right the pressure in T increases over that in T_1 as shown in the first part of curve from (a) to (b); the elastic membrane is subjected to a pressure from (A) causing it to stretch into shape shown in dotted lines. This stretching of the membrane allows a flow of liquid into receptacle A, thru F_1 and W_1. A half period later the membrane will be stretched in the other direction allowing a similar flow of liquid into B, through F and W. A surging of liquid back and forth occurs, periodically varying, as does the pressure. It should be emphasized that when the rate of flow is maximum, the pressure is zero and when the rate of flow is zero the pressure is maximum, because the flow has ceased when the membrane is stretched to its maximum position, at which time the pressure is at a maximum. Furthermore, when the pressure is at a maximum in tank T, and just starts to decrease, the flow of fluid will be cycle, counting time from left to right, it is found that the pressure curve lags behind the flow curve one-fourth period or cycle.

In Fig. 5, K is a source of alternating current which supplies electrical pressure to C_1 a condenser; L_1, an inductance coil; and R_1, a non-inductive resistance. Let the wave of electromotive force of K be repre- toward this tank T, and negative with respect to the pressure in T. Therefore to draw the curve of fluid flow in circuit C, start at the point b and draw a curve I_c downward so that the **maximum** and **zero** values of flow will coincide with **zero** and **maximum** of pressure respectively. Now if the curves are followed through one sented by the same curve E of fluid pressure, Fig. 4. Close the switch which controls circuit C_1. When the voltage is a maximum as at b the charge into the condenser is a maximum and the current has ceased to flow and is zero. An instant after the time (b) the voltage decreases, releasing the charge on the condenser, causing a current to flow in a direction opposed to the voltage decreases. Therefore, from the foregoing, it is evident that the curve of current will start at b and be drawn downward and will coincide with the curve of fluid flow I_c, Fig. 4, which hereafter in this article will represent fluid flow in C and amperes in C_1. Hence it is shown that an alternating current leads the impressed voltage lags by a quarter period, or expressed in other words, the impressed voltage lags behind the current of a condenser circuit one-quarter period, or ninety degrees.

Referring again to Fig. 3, close all the valves except the one which controls the flow into vessel L, and study the effect which the alternating fluid pres-

sure has on the rate of flow and its time relation with the latter. Assume that the massive disk M is moving to the right and passing through the neutral position at the instant the water pressure is starting to increase in A. This increasing pressure in A exerts a retarding effect on M, and stops its motion at the instant when the fluid pressure has reached its maximum value (at b on the curve), Fig. 4. The

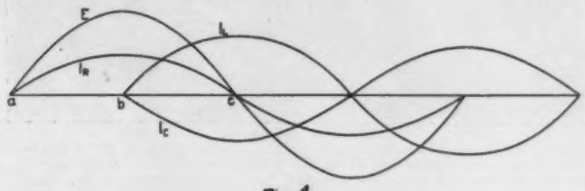


Fig. 4

Curves illustrating relation of pressure and flow in mechanical and electrical processes

mass M will now be forced back by the continued though declining pressure in A, and will again have reached its neutral position (moving in the opposite direction) at the instant when the pressure in A has decreased to zero and the pressure in B has started to increase (position c on curve), and the same half cycle is repeated in B as in A. It is now apparent that M alternates back and forth, but due to its inertia lags one-quarter period behind the force which causes its motion. It is also apparent that the flow of fluid in and out of the chambers A and B connecting pipes F and F is alternating in character, and maximum value (at b on the curve) Fig 4. The mass will now be forced back by the continued though declining pressure in A, and will again have reached its neutral position (moving in the opposite direction) at the instant when the pressure in A has decreased to zero and the pressure in B has started to increase (position c on curve), and the same half-cycle is repeated in B as in A. It is now apparent that M alternates back and forth, but due to its inertia lags one-quarter period behind the force which causes its motion. It is also apparent that the flow of fluid in and out of the chambers A and B connecting pipes F and F is alternating in character, and since it coincides with the motion of M lags behind the pressure one-quarter period. Therefore a curve I_L (Fig. 4) drawn through b upward will represent the flow of fluid in the circuit L, and will lag one-quarter cycle behind E.

In Fig. 5, L_1 is an inductance made up of a number of turns of wire. When an alternating electromotive force is impressed on this coil, an alternating current flows. The flow of this current produces a flux, which, interlinking with the turns, induces a counter electromotive force in opposition to that impressed upon the circuit. This retarding effect causes the current to lag behind the electromotive force a quarter period. Therefore the curve of fluid flow in circuit L will also represent the curve of current flow in an inductive circuit such as L in Fig 5.

Again referring to Fig. 3, close all valves except the one controlling the flow of water through the long pipe R. In this circuit, there is no absorbing or elastic medium to alternately absorb and discharge quantities of fluid; neither is there any moving mass of great inertia to retard the alternating flow of fluid. Therefore the flow of fluid through the pipe is controlled only by the frictional resistance, and the rate of flow at any instant is proportional to the difference of pressure between the two ends of the pipe. Consequently the rate of flow is a maximum when the pressure is a maximum, the rate of flow is zero when the pressure is zero. A curve of fluid flow can be represented by a curve I_R (Fig. 4) coinciding in time relation with the pressure curve E.

The resistance R_1 in Fig. 5 is non-inductive, containing no elastic or absorbing effect such as was

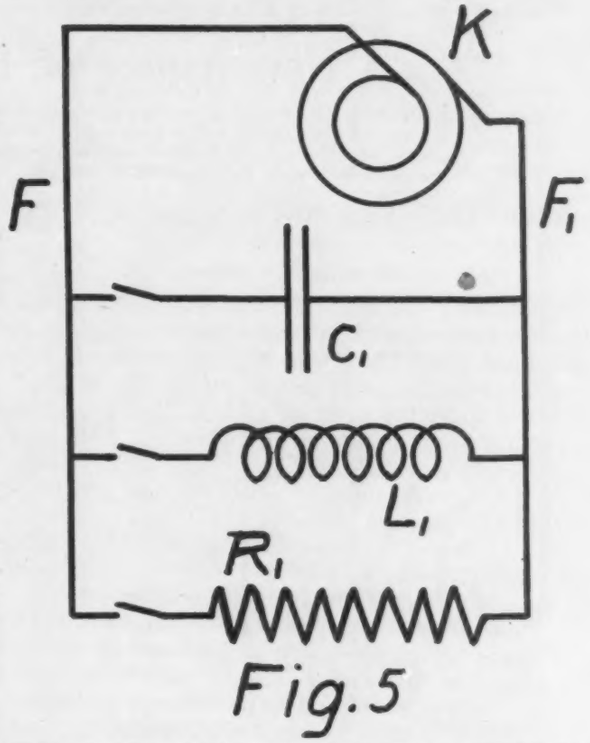


Fig. 5

Diagram illustrating electrical parallels of principles demonstrated in Fig. 3

found in cricuit C; neither has it conditions which produce counter electromotive forces, or retarding forces such as was found in the inductive circuit L, hence the current at any instant is proportional to the electromotive force. The current will be a maximum when the electromotive force is a maximum and will be zero when the electromotive force is zero. Consequently the curve I_R, Fig. 4, will represent the flow of electricity in the resistance R_1 as well as the flow of fluid in the pipe R.

A WISE MAN

is considering the Northwest Electric Light and Power Association Convention —

Spokane, Washington, September 8-11

The above views of the recreation center which was established by the Southern California Edison Company for the men engaged in the construction of the Kern River plant, show what can be done in the way of providing wholesome entertainment to fill the leisure hours of the employes. The exterior of the recreation center is shown on the left and the moving picture show which took place in the mess hall is shown to the right.

A New Aspect of Public Utility Service

(Service to the public is the creed of the modern public utility, but service to the public means a spirit of cooperation and a high degree of efficiency within the organization itself. Two methods by which one large Western company works towards this are described below. Both authors are connected with the Southern California Edison Company.—The Editor.)

RECREATIONAL WORK IN CONSTRUCTION CAMPS

BY RICHARD E. SMITH

Realizing the importance of wholesome recreation for the men engaged in construction work at its new Kern River plant, the Southern California Edison Company has established entertainment headquarters under the direction of J. A. Mathews. This department was organized in November, 1919, and in the eight months period just closed 31,708 people have been entertained by the various programs offered. These have consisted of 187 moving picture shows, 11 dances, 14 ball games, and 4 boxing bouts, the schedule being so arranged that the workers in all the eight camps have an opportunity to attend.

There are two major recreation centers at which well equipped club rooms are maintained. In each of these buildings there are pool and billiard tables, card tables, a player piano and a phonograph, a barber shop, library and sales canteen at which candies, cigars and drinks may be secured at commissary prices. The libraries are supplied from the traveling library supported by Kern county, and have the distinction of being the best patronized of any of the branches, with a circulation each month of 135%.

Thursday of each week is ladies' day, giving the women living at the camps the use of the building for card parties in the afternoon, the evenings being devoted to dancing. From time to time "stunt nights" are given over to programs by local talent, and occasionally professional vaudeville players are engaged.

However, the principal entertainment features are the moving picture shows which are planned so that one is given every night at one of the camps. For these a seven reel program is arranged consisting of a five reel feature and a two reel comedy. These are the highest type of picture and are secured as soon as they are released from the large city playhouses. During warm weather these are given out of doors while the mess halls are used in the winter. The pictures are rented for a week, and are circulated from camp to camp during that time.

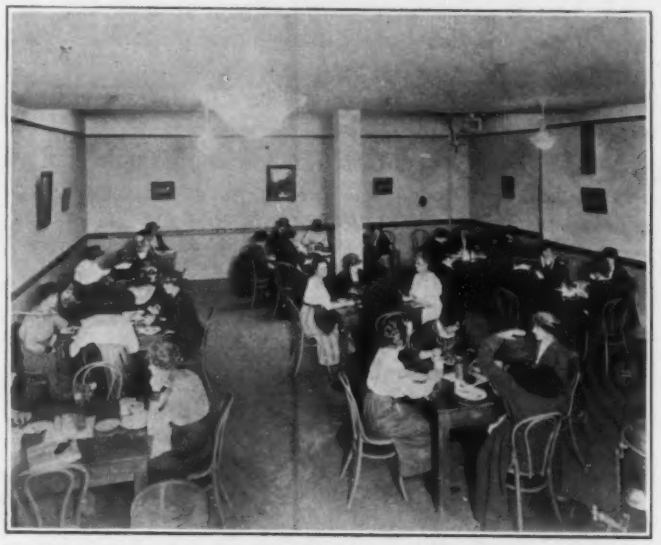
Mr. Mathews has two assistants besides such volunteer help as may be needed on special occasions. All expenses are paid by the company except a table charge for billiards to cover maintenance of the equipment.

LUNCH SERVICE AT COST

BY GERTRUDE O. TUCKER

Service is the foundation of the modern public utility structure, and as charity begins at home, so the utility companies find that every privilege extended to their employes is reflected in the service which they give to the company and to the public.

Physical well being is so closely connected with mental efficiency that when one of the largest utility companies in the state announced that it would furnish to its employes a hot, home-cooked lunch at the cost of the food, the idea was welcomed as a big advance toward the ideal of efficiency.



Electric lunch room, Southern California Edison Company, Los Angeles

As electricity is the stock in trade of this utility, the natural thing was to turn its good offices to this most practical use. Two automatic ranges, with ovens that work on the fireless cooker principle, were installed. Electric cooking was an innovation to the woman in charge, but she took to it like a duck to water and was quick to make good use of all its conveniences. Even the manufacturers' agents were dubious about the behavior of the ranges under the high load factor of feeding more than one hundred a day, but now they are growing chesty over the record of nine months' continuous use without a serious interruption.

The kitchen is such an attractive part of the lunchroom that it is not separated from it, except by a screen and counter. The food is dispensed on the self-service plan, and this time-saving element is greatly appreciated by those who formerly stood in the long snake-like line at cafeterias, or waited for some slow-moving individual to bring them their lunch.

The self-service idea is also extended to drinkables. An electric urn furnishes coffee and hot water at the turn of the spigots, and the tea or coffee is easily regulated to the strength preferred.

A steam table with electric elements keeps the food perfectly, even for the late comers, and leaves the cooking space and ovens of the ranges free for actual cooking. The elements beneath the steam table also act as warmers for the plates in the cupboards below.

But "the proof of the pudding is the eating," and the most encouraging remarks to those who sponsored this innovation are such as: "I have gained five pounds the last month and saved over five dollars on my lunches"; "I just can't eat at any other place in town—every time I do, I am sick"; and from one who earnestly watches that her weight does not go above a certain mark, "I simply must give up the lunchroom next month. I shall be a sight. Everything looks and tastes so good, it is no use trying to diet while I eat here."

Electric lights and flowers on the table help to make the picture an attractive one. Electric fans do their part in keeping the air fresh and cool, and the atmosphere of friendliness and contentment which originates in the electric lunchroom radiates to all other departments of the building.

Cost of Money

(The question of financing public utility improvements and extensions, rendered necessary by the phenomenal increase in demands for power, is inseparably bound up with the question of rate regulation. That the financial crippling of a power company for the benefit of its customers eventually reacts in inadequate service to those customers is brought out in the following article.—The Editor.)

It is generally recognized that the revenues of public utilities are at present insufficient to enable them to supply their territory with adequate service, and to enlarge their facilities in proportion to the continually increasing demands of the territory served, it being true that the revenues received for the service have been less than the necessary amount required to be expended to cover operating expenses, taxes and interest charges, and leave a sufficient reserve to offset accruing depreciation.

Public utilities must, in the immediate future, incur large expenditures for deferred maintenance and postponed construction of needed betterments and extensions. It is obvious that future revenues of the public utilities must be greater than past revenues (a) because extraordinary capital expenditures must be made, and (b) because current expenses due to increased wages, taxes and higher costs of labor, materials and supplies will be much larger than they have been in the past.

Unless regulating authorities adopt a policy that will enable public utility corporations to meet their increasing expenses and secure necessary capital for additions and betterments, the operation of these corporations will fail and the general public will be burdened with either an insolvent public utility or a public utility whose ability to serve is inadequate.

It is clear that if the general public is to be adequately served, the Commission must adopt a policy of regulation that will permit or cause the public utilities to obtain the income needed to establish such adequate service, afford a reasonable wage for employes, and such return on present investment as will induce investors to furnish additional investment to enable the public utility corporation to continue its construction program.

At present there seems to be no definite rule for rate regulation by public service commissions. There should be some effort to establish normal revenues, varied from time to time in accordance with the cost of money, and there should be some automatic or quickly available method for the varying of rates when necessitated by changed conditions.

The responsibility for maintenance of the credit of the corporation so that it can be continued on a sound economic basis rests definitely with the regulating authorities, and there should be a clear recognition on their part that adequate service is more important to the general public than a restriction of profits to a minimum.

The obligation to initiate reasonable rates and schedules as business exigencies require rests upon the management, and such management should not be interfered with by the regulating authorities except upon definite proof that the rates and charges, whether existing or proposed, are unduly burdensome. No complaint of the rates and charges of a public utility should have standing unless the complainant fully demonstrates the undue burden of his particular rate in relation to the circumstances of his use of the service.

The following rule might well be adopted in fixing rates and charges by governmental authority:

A rate may be charged that is designed to yield the utility in each class of service rendered, aggregate revenues which will provide (after adequate charge for recurring renewals and depreciations) such net return upon a fair value in the circumstances (determined by public authority) of the property devoted to the public use as will be sufficient in amount to enable the public utility to obtain, at reasonable cost, the capital required to furnish the public with adequate facilities and efficient and economical service.

Under such a rule rates ordinarily would be established that would permit the general public to make full use of the facilities provided. Further, a continually increasing demand for additional facilities would practically demonstrate that the existing rates were reasonable.

The public utility management will from time to time enter the money market and bid for new money for new facilities at as low a rate as possible, and the cost of this money to the company having good general credit should be construed as reasonable cost of money.

There is no normal price for securities of any particular kind, the general rule being—the greater the security and the greater the probability of payment when due and the greater the probability of a dependable return, the higher the price of the security and the lower the cost of money.

ELECTRIC COOKING SCHOOL

(Among the interesting events in which the electrical home has been featured recently is the six-days' electrical cooking school in Salt Lake City, described in the following article.—The Editor.)

A cooking school, served entirely with electricity, and featuring practically all the modern uses of electricity in the home, was conducted in Salt Lake City from August 2nd to 7th inclusive by the Salt Lake Telegram, in conjunction with the Utah Power & Light Company, all the other leading electrical concerns of the city, and various merchants and manufacturers of food products.

Miss Edith Clift, of Chicago, a domestic science expert, conducted all of the cooking demonstrations, which were given from 2 to 3:30 p.m. every day, preceded by a musical program from 1:30 to 2 p.m.

Miss Clift gave demonstrations in the preparation of practically every kind of food. She took up every branch of the culinary art, and showed the use of all kinds of materials and cooking appliances.

Entirely different demonstrations were presented each afternoon, and the course concluded with a special bread, pie and cake baking contest, in which hundreds of dollars' worth of prizes were distributed.

An amazing array of electrical appliances, some of which had never been shown before in the city, were on exhibition, to demonstrate to the housewives the modern way of avoiding household drudgery.

Cooking contests were held each day, for which valuable prizes were given, the prizes consisting of various electrical appliances contributed by electrical firms of the city, and various articles of merchandise contributed by the merchants and manufacturing firms. These daily contests, in which a large number of housewives participated, were in the making and baking of bread, various kinds of cake, doughnuts, etc.; and a grand sweepstake prize of one electric range was given for the best individual loaf of bread.

Another contest which attracted considerable interest was one in which a large pile of two, three and four way attachment plugs was placed on a table, and the contestants were required to make guesses as to the total number of appliances which would be operated by these plugs.

One of the main features was a wedding which took place at the cooking school, the happy newlyweds receiving as a present an electric hope chest, which contained practically everything in the way of thoroughly up-to-the-minute work-destroying electrical appliances. Here is what was in it: Electric range, washing machine, vacuum cleaner, five table lamps, five cartons of Mazda lamps, vibrator, curling iron, toaster, iron, household motor, chafing dish, heater, milk warmer and warming pad. These were contributed by the following electrical firms: Utah Power & Light Company, Edison Electric Appliance

The above picture is of the six-day electrical cooking school which was conducted for one week during the past month in Salt Lake City. This was conducted under the auspices of the Salt Lake Telegram, the Utah Power and Light Company, the leading electrical concerns of the city and various merchants and manufacturers of food products. This sort of school gives much the same message to the housewife as does the more elaborate Electrical Home.

Company, Western Electric Company, Capital Electric Company, Intermountain Electric Company, and Kiser-Ackerman-Gardner Company.

There were hundreds of interesting and attractive exhibits, representing not only the electrical industry, but the products of the various manufacturers and merchants of the city.

Electricity was, of course, the feature, and the hundreds of housewives who attended the school were thoroughly convinced that the more extended use of electricity in the home would solve most of the housework problems with which they have been confronted—that the harnessing of electricity to the work of washing, cleaning, ironing, cooking, etc., would be the real solution.

The cooking school is an annual affair, and each one is better than the last. The one just closed was undoubtedly the best attended and most successful yet held, and more interest than ever was shown in the application of electricity as an efficient time and energy saver in the home.

The Industrial Load in California

(The industrial growth of California is one of the most significant developments affecting the electrical industry west of the Rockies. The fact that a great number of California's most important industries are large consumers of electric power is brought out in the returns from a survey carried out by staff of Electrical World for the McGraw-Hill Company, and published in full in Electrical World. Following is a digest of some of the data obtained.—The Editor.)

In an endeavor to ascertain the extent and distribution of the industrial load in California, detail questionnaires were sent to 1,289 industrial concerns.

A map of the state of California divided in four sections, showing the location of the leading industrial consumers of electricity in the state. Among the various industries that of food-preparation is the most important in value of products. This map was prepared as the result of a questionnaire sent to 1,289 industrial concerns for the purpose of ascertaining the extent and distribution of this industrial load in California. A comparison of this data with a similar survey which has been made of the entire United States shows that the central stations of this section of the country show an unusual mastery of the industrial situation.

The names of these firms were obtained through the various local chambers of commerce of the state, and the list is believed to represent the total number of primary industrial establishments employing more than fifty operatives each. The accompanying map shows the distribution of these industrial plants by sections of the state. Answers have been received from 229 companies which were so distributed among various industries as to give a very definite idea of the industrial power situation in California. Some very optimistic conclusions relative to the advantages of electrical energy in industry as a whole are to be drawn from this survey.

Principal Industries

The principal manufacturing industries in California using electricity as a source of power, as indicated by the survey, are iron and steel, including foundries and machine shops; shipbuilding; cement plants; food, including canning and preserving plants; mining; paper mills and paper products; chemicals, and lumber and lumber products.

An interesting item brought out by the data obtained is the comparatively small amount of energy generated by private plants. The generation of energy by the private plants of lumber and mining companies is to be expected on account of their isolation and the difficulty in taking care of the waste, but the fact that with the further exception of the food and iron and steel industries, no report of other private generating plants was received is a clear indication of the efficient manner in which the central station is meeting the load requirements of California's industries. There is probably no other section of the country which can show such a mastery of the industrial situation by the central stations.

Food Preparation

The food-preparation industry is the most important in California in value of products. This industry includes the canning of fruits and vegetables, fish, oysters, clams, etc.; packing of dried fruits, the manufacture of pickles, jellies, preserves, sauces, etc.; wholesale slaughtering and meat packing and manufacture of sausage; flour-mill and grist-mill products; butter, cheese and condensed milk, and sugar manufacture. There are 316 plants of this general class in the state employing more than fifty operatives each, of which 45 per cent are in the north central part of the state.

The uses of electrical energy in factories of this industry are many on account of the varied processes necessary in the manufacture of food products. Motors are used to operate pumps, cream separators, churns, bottle and can washers, refrigeration machinery, conveyers, elevators, beet slicers, preserving machinery, presses, grinders, sealing machines, blowers and compressors. The heating of water and milk and the operation of cookers, sterilizers and dryers is accomplished in many cases by electrical energy.

Foundry and Machine Shops

The iron and steel industry, which in California is confined to foundry and machine shop activities, ranks fourth among the manufacturing industries of the state. There are about 208 plants of this class employing more than fifty operatives each, of which about 71.2 per cent are in the north central section of the state. This industry gives employment to about 7 per cent of the total labor of the state. In amount of electrical energy used, however, it ranks first among California's industries, and the returns indicate that about 31 per cent of the industrial load in the state is utilized by foundries and machine shops.

The uses of the motor in the iron and steel industry are not so varied as in the food-preparation

industry. Among the primary uses are the operation of cranes, air compressors, sand mills, planers, grinders, boring mills, straightening presses, fans, blowers, saws, drill presses, rolling mills, hoists, conveyors, sand-blast exhausters, etc.

Electricity in Shipyards

The shipbuilding industry could not be considered as a primary industry of California prior to the war. At the present time, however, it takes rank among the first. Practically all up-to-date shipbuilding yards are equipped throughout with the latest electrical devices. The thirteen shipbuilding plants reporting consume 41,116,484 kw-hr. of electrical energy per year. The survey indicates that no other class of industry in California consumes so much electrical energy per plant with the exception of cement mills.

Electric motors in shipyards are used to operate the following machinery: compressors, punches, shears, ship and overhead cranes, beading rolls, scarfers, angle benders, lathers, drill presses, pumps, boring bars, joiners, cutoff saws, shapers, pipe tools, winches, exhaust fans, bolt cutters, conveyors, marine railways, etc.

The adoption of electric drive in stone, clay and glass plants has been very general. One large cement mill reported an annual consumption of 20,866,970 kw-hr. This plant uses more than 158 motors with a total installed rating of 7,478 hp. About 87 per cent of the machines in this plant are belt-driven, and 12 per cent are direct-connected. Electric motors are used to operate crushers, rollers, kilns, elevators, conveyors, sack-filling machines, shovels, compressors, pumps, crane, screens, drills, etc.

Lumber Industry

Lumbering and lumber manufactures constitute one of California's primary industries. The manufacturing end of the lumber industry is almost all electrically driven at the present time. The logging operations which could be worked electrically to great advantage are handicapped in California, or in fact in any lumber country, by the scarcity of power transmission lines. Electric motor drives in woodworking plants have the advantage of decreasing the fire hazard, which is a big item in the lumber industry. Motors allow individual control and variable speed for machines such as hoists, veneer peelers and conveyors. One of the latest developments in the use of the electric motor in the lumber industry is to be found in electrically operated set works on carriages in sawmills.

Some of the machines operated by electric motors in the lumber industry are saws, lathes, shapers, borers, elevators, jointers, blowers, drill presses, pipe cutters, punch presses, pumps, sorting lumber tables, cranes, etc. The storage-battery locomotive for trucking is widely used in the lumber industry.

The adoption of electric drive in other California industries has not been as general as in those cited above. It is possible, however, that a fuller response to the questionnaires would show that several other industries were adopting electrical drive quite generally.

PROBLEMS IN ORNAMENTAL STREET LIGHTING

(The appearance of our cities during at least eight hours of the day depends largely upon the good taste and effectiveness of their street lighting. The value of an ornamental lighting system and the practical means of maintaining and installing such are discussed here by L. A. S. Wood, manager of the illuminating Section of the Westinghouse Electric & Manufacturing Company.—The Editor.)

The term "Whiteway" has been used extensively in connection with ornamental street lighting and has been the cause of considerable misapprehension on the part of the public as to the purpose of ornamental street lighting. An ornamental street lighting system should be considered as part of a scheme for beautifying the city as a whole and not as a means of advertising one section of a city perhaps to the detriment of some other locality.

The cost of the installation of an ornamental street lighting system might very well be borne by the property owners on the street where the ornamental system is to be installed, but the maintenance of such a system should be borne by the city as a whole.

The most satisfactory way of financing an ornamental street lighting system is for an improvement district to be created and the adjacent property owners assessed on a front foot basis in the same way as they would be assessed for any other municipal improvement. In general the expense to the property owner for the complete installation under a scheme of this character is very low, usually not more than $1.50 per front foot, while the cost to the individual citizen for maintenance of the improved system from which he receives material benefit is negligible.

It is thought that the central station should discourage the indiscriminate installation of ornamental posts outside business premises and all suggestions for "Whiteways" should be the subject of careful consideration and consultation with the city authorities before the central station takes an active part in their promotion. Whiteways should always be considered in connection with the "City Beautiful" idea and in the light of ornamental systems benefiting the city as a whole rather than as a means of advertising some particular locality.

The manufacturers of ornamental street lighting devices may with advantage be consulted and their suggestions given very serious consideration before any ornamental system is designed, for some of the manufacturers of this class of apparatus have collected valuable data on the subject which is at the service of any city interested in the proposition.

There is considerable difference of opinion among engineers as to the best type of glassware for street lighting units, but the general consensus of opinion is in favor of diffusing glassware for ornamental units owing to the practical elimination of glare with this type of glass.

Glare within the range of vision of the pedestrian or vehicle driver should always be avoided. It causes the pupil of the eye to contract in an effort to protect the delicate mechanism of the retina, thus

preventing the observer from seeing as well as he would be able to do with a light source of lower intensity but more perfect diffusion.

The many new developments which are coming about in the realm of street lighting assure us that the "City Beautiful" will soon be an accomplished fact in so far as the lighting of our streets is concerned.

FUEL CONSERVATION AND WATER POWER

"It has become clearly recognized that cheap power is one of the basic factors enabling manufacturing countries successfully to compete in the world's markets," says Mr. Arthur V. White, consulting engineer with the Canadian Commission of Conservation, in a recently published reprint from the Commission's tenth annual report. The writer goes on to discuss the problem of fuel conservation, and the efforts which are being made to solve it in various countries:

"In the United States there were found in factories, office buildings, hotels, apartments, institutions, hospitals, etc., about 30,000 local electric generating plants. Many were readily supplied from some adjacent large central station. Where changes were made a general fuel saving of from 20 to 60 per cent resulted.

"The efficiency of a modern steam turbine approaches 80 per cent, although the terminal efficiency—that is to say the ratio of the heat unit equivalent to one kilowatt-hour at the generator terminals divided by the heat units in the fuel consumed to produce one kilowatt-hour—is, in actual practice, rarely higher than 20 per cent. Research is devoting special effort to improvement in this field, and some look to the vaporization of a combination of fluids instead of simply water.

"Effort is being made to standardize, within reasonably flexible limits, such apparatus or portions of apparatus as do not require to possess such variations as have hitherto existed. Take, for example, the standardizing of frequency for electric systems. We may expect, profiting from the lessons of the past, where new lines of industrial activity are opened up, there will be an increased effort to conform to certain basic standards, thereby avoiding complexity and inefficiency.

"In the United Kingdom the methods of mining and using coal have been the subject of an important and comprehensive investigation by the Coal Conservation Committee of the Ministry of Reconstruction. Its final report was issued in 1918. The present coal consumption, for power purposes, in the United Kingdom is at least 80,000,000 tons. By proper coordinated and centralized systems of power production and distribution for the whole country, it is estimated that 55,000,000 tons of coal per annum might be saved.

"The Reconstruction Committee lays special emphasis upon the part which power will play in the cost of manufacture and in the matter of international industrial competition, to which all countries are devoting such great attention. The economies resulting from the supplying of power to industry through the agency of the electric motor are everywhere recognized. In the munition factories erected during the war 95 per cent of the machinery was electrically driven.

"Respecting the question of conservation through the elimination of a great deal of the coal distribution by construction of power plants in the coal districts, the electric energy being transmitted to the various industrial centers of the country over high tension transmission lines, L. H. Rittenhouse, chief of the Power Section, Production Bureau of the U. S. Fuel Administration, says:

" 'It will only be a question of time before large super-stations will be constructed in some of the coal fields, particularly those near the congested industrial sections in the east, and full advantage taken of the opportunity to burn culm or refuse fuel, together with the advantage of distribution at high voltage to industrial centers.'

"The near future promises increasingly great development of hydroelectric power for use in the electrification of railways now using steam motive power.

"Greatly increased attention is being given to the subject of the inter-connection of various electric plants, whether steam-electric or hydro-electric, or combination of both, with the object of securing greater efficiency in the supply of power and light to districts respectively served.

"Mr. L. R. Clapp, chief of the States Conservation Bureau of the Federal Administration, writes:

" 'The inter-connection of power systems, both steam and hydro-electric, offers an opportunity for real fuel economy. In many parts of the country duplicate transmission systems exist, serving practically the same territory. One or more of such lines may derive all or nearly all of its power from water while other companies use coal. No company operates with a continuous one hundred per cent load factor, and almost always the peaks are different for different companies. Therefore inter-connections permit the use of the maximum water power and also allow an increase in the average load factor.'

"If authorities find through the enforced utilization of insulation upon steam piping, heaters, etc., or by the shutting down of uneconomical plants, or the substitution of efficient for inefficient apparatus, or the repair of apparatus, or in other ways, that very substantial savings of coal may be effected, then such economies, according to some reasonable scheme of administration, should be made compulsory in Canada."

SAN FRANCISQUITO PLANT NUMBER TWO IS PUT INTO OPERATION

The first unit in the Number Two plant belonging to the city of Los Angeles has been put into operation. The new plant, which utilizes water power from the Los Angeles aqueduct, is located in the San Francisquito Canyon some forty miles from Los Angeles and seven miles below Power Number One, which was put into operation in March, 1917.

A view of the San Francisquito Plant Number Two taken during the early days of construction.

The building structure is of reinforced concrete and of ample size to accommodate, when finally equipped, three 17,500-kva. G. E. three-phase, 50 cycle, 428 revolutions per minute generators. The generators are direct connected on the same vertical shaft to 25,000-hp. Francis turbines using 300 second-feet of water. General Electric exciters are used and are direct connected to the generators on an extension of the generator shaft. Spring thrust bearings of the same make are used between the exciters and the generators.

At present there are two seven-foot steel penstocks, 1430 feet in length, running from the forebay to the turbines. The plant has an operating head of 530 feet. When the plant is finally completed there will be three penstocks, the third one to be similar to the two already constructed.

The generator voltage is 6600 and is stepped up through a bank of three General Electric 5833-kva. transformers to 110,000. Each transformer is equipped with an oil conservator. Two banks of transformers have been installed, the second one having been put in operation since the recent completion of the installation of the second generator. No definite time has been set for the installation of the third unit. When the plant is finally equipped it will have a combined capacity of 61,500 hp.

Balance Sheet of

December 31, 1919

	ARIZONA		CALIFORNIA					
	Arizona Power Co.	Pacific Gas and Electric Co.	California-Oregon Power Co.	Great Western Power Co.	Pacific Gas and Electric Co.	Southern California Edison Co.	San Diego Consolidated Gas & Electric Co.	San Joaquin Light and Power Corp.
ASSETS								
Total Fixed Capital	$ 6,585,449.35	$ 2,739,486.65	$17,467,792.55	$58,650,813.89	$151,030,720.87	$ 74,749,309.13	$ 9,617,682.10	$ 29,692,031.87
Cash and Deposits	21,731.25	94,749.08	8,533.94*	3,999,245.95	2,201,751.26	1,027,553.19	110,530.70	368,282.88
Notes Receivable		191.60		104,757.08	54,100.37	60,328.16	9,978.18	371,555.15
Accounts Receivable	73,342.25	127,062.69	151,159.06	1,114,356.17	3,844,026.54	4,775,584.53	184,584.77	1,155,300.45
Other Current Assets	31,679.17			11,785.18	57,201.24	16.68	31,437.39	
Investments		80,461.57	211,383.31	1,608,391.58	1,032,813.80	5,403,243.60	14,800.00	363,413.60
Working Assets		71,755.11	103,641.05	403,467.65	8,826,890.83	1,746,225.20	237,192.45	1,058,575.57
Treasury Securities	2.00	17,000.00	1,717,000.00	5,741,800.00	1,358,952.35		688,000.00	668,359.17
Prepaid Expenses	219.79	5,126.33	5,811.24	207,376.37	29,185.66	390,190.08	4,544.41	12,320.08
Unamortized Discounts on Securities and Expense	996,229.85	12,392.80	801,237.82†	1,829,166.40	9,337,224.68	2,998,990.46	698,264.66	2,010,544.59
Miscellaneous	820.00	25,903.38	1,172,539.25	2,255,155.15	2,586,057.16	9,291,148.36	176,140.43	4,942,825.54
TOTAL ASSETS	$ 7,709,473.66	$ 3,174,129.21	$ 21,622,030.34	$ 75,926,315.42	$180,358,924.76	$100,451,589.39	$ 11,773,155.09	$ 40,643,208.90
LIABILITIES								
Capital Stock	$ 3,945,000.00	$ 1,200,000.00	$ 10,000,000.00	$ 28,838,526.37	$ 62,801,138.00	$ 34,556,872.00	$ 3,900,400.00	$ 17,500,000.00
Installments on Stock Subscriptions					1,252,500.00	248,092.92		321,259.98[1]
Funded Debt	2,120,900.00	1,286,400.00	5,600,000.00	40,931,900.00	94,140,558.15	49,771,000.00	6,707,000.00	16,980,000.00
Notes Payable	137,526.32	30,000.00	16,752.95		240,283.31	5,449,262.15		1,080,714.81
Accounts Payable	104,493.43	113,712.94	675,450.52	617,892.22	2,549,074.29	1,654,754.28	165,200.99	1,425,001.46
Interest and Taxes Accrued	33,090.89	4,375.00	1,129,798.29	977,035.23	2,387,390.31	720,840.45	197,536.01	345,740.75
Miscellaneous	6,992.44	105,502.94	1,728,230.20	229,780.00	549,503.65	1,153,197.55	41,169.50	83,295.34
Reserves	1,058,514.99	279,711.52	752,523.28	879,992.39	11,648,060.32	6,317,009.66	710,982.18	2,038,266.08
Corporate Surplus	302,955.59	154,426.81	1,708,487.10	3,451,189.21	4,790,416.73	580,560.38	50,866.41	868,930.48
TOTAL LIABILITIES	$ 7,709,473.66	$ 3,174,129.21	$ 21,622,030.34	$ 75,926,315.42	$180,358,924.76	$100,451,589.39	$ 11,773,155.09	$ 40,643,208.90
INCOME AND PROFIT AND LOSS ACCOUNT								
Operating Revenue			$ 724,418.88	$ 3,128,928.50	$ 25,938,371.99	$ 9,241,245.96	$ 2,274,962.62	$ 3,211,570.44
Operating Expense			452,156.20	1,570,443.63	17,578,262.39	5,445,341.45	1,638,046.33	2,215,982.47
Net Operating Revenue			272,262.68	1,558,484.87	8,360,109.60	3,795,904.51	636,916.29	995,587.97
Non-operating Revenue			1,660.42	191,763.70	583,849.69	1,461,761.68		52,269.21
Gross Corporate Income			273,923.10	1,750,248.57	8,943,959.29	5,257,666.19	636,916.29	1,047,857.18
DEDUCTIONS								
Non-operating Revenue Deductions				$ 17,142.02	$ 21,764.76	$ 133,442.89		$ 252.90
Interest Accrued on Funded Debt			$ 284,800.00	1,115,221.27	4,279,743.52	2,727,131.10	$ 314,880.00	675,302.40
Other Interest Deductions			23,942.86	13,588.80	5,513.42	13,789.97*	+5,328.41	64,287.96
Rent Deductions				156,887.06	1,365.91*	29,433.73	44,902.69	
Miscellaneous Deductions			6,018.79	76,864.11	297,950.67	398,265.74		34,121.22
TOTAL DEDUCTIONS			$ 314,761.65	$ 1,379,703.26	$ 4,603,606.46	$ 3,274,483.49	$ 354,454.28	$ 773,964.48
Net Corporate Income for Year			$ —40,838.55	$ 370,545.31	$ 4,340,352.83	$ 1,983,182.70	$ 282,462.01	$ 273,892.70
Dividends				386,222.13	3,237,056.06	1,950,883.39	277,260.98	390,000.00
Miscellaneous Additions to Income			6,449.19	3,501,265.16	94,954.29	2,563.58		2,503.68
Miscellaneous Deductions from Income			7,720.76	55,490.12	1,068,141.82	22,785.20	5,201.03	187,265.06
Surplus on Dec. 31, 1918			—759,127.70	21,090.99	4,660,307.49	568,482.69	50,866.41	1,169,799.16
Surplus on Dec. 31, 1919			—801,237.82	3,451,189.21	4,790,416.73	580,560.38	50,866.41	868,930.48

*Credit item.
†Corporate deficit.

[1]Capital surplus appreciation of fixed capital.

THE balance sheets presented here of the principal power companies of seven Western states should be studied by every reader of the Journal of Electricity. Study especially the balance sheet of your local power company and if it looks particularly healthy to you, show your good business judgment by investing in the securities of that company, as at the present time the average security of a central station will pay more than double the interest that you receive from your bank. If the power company in your district is not making a fair return on the investment, make it your business to talk with the members of that company and find out exactly why it is not in a healthy financial condition. Then sell the idea to the community that the development of their community depends upon the ability of their local power company to expand; to have plenty of power to attract industrial enterprises and render excellent service to its consumers. This is only possible when the power company is allowed to charge

Western Power Companies

December 31, 1919

	IDAHO	MONTANA	NEVADA	OREGON		UTAH
	Idaho Power Co.	Montana Power Co.	Truckee River General Electric Co.	Pacific Power and Light Co.	Portland Railway Light and Power Co.	Utah Power and Light Co.
ASSETS						
Total Fixed Capital	$ 24,619,305.22	$ 92,519,483.71	$ 10,592,453.74	$ 17,698,300.08	$ 58,708,771.88	$ 58,399,503.69
Cash and Deposits	205,072.10	1,461,357.66	47,851.49	72,059.95	449,383.95	969,338.40
Notes Receivable	554,485.18	101,667.35	1,063.31	49,880.46	189,530.25	1,733,117.32
Accounts Receivable	405,996.71	752,435.40	31,665.37	440,352.54	452,090.58	678,516.28
Other Current Assets	13,229.20			5,551.98	39,553.98	192,896.55
Investments	178,855.00	529,297.20	15,750.00	1,018,727.66	7,571,372.46	12,576,784.51
Working Assets	265,126.18	544,137.63	18,754.50	342,992.48	502,750.21	575,040.97
Treasury Securities	789,400.00					
Prepaid Expenses	4,788.53	18,513.50	278.02	1,969.13	40,279.61	3,319.98
Unamortized Discounts on Securities and Expense	746,258.12	2,860,695.41[1]		659,593.73	2,125,499.72	2,679,186.47
Miscellaneous	170,143.51	91,086.05		15,682.59	2,243,241.11[2]	21,711.00
Total Assets	$ 27,952,659.75	$ 98,878,673.91	$ 10,707,816.43	$ 20,305,090.60	$ 72,322,474.75	$ 77,829,415.17
LIABILITIES						
Capital Stock	$ 16,250,000.00	$ 59,079,300.00	$ 3,000,000.00	$ 10,350,000.00	$ 21,250,000.00	$ 43,387,000.00
Installments on Stock Subscriptions					515,277.99[1]	909.98
Funded Debt	9,999,789.88	32,942,700.00		9,119,000.00	42,496,000.00	23,566,000.00
Notes Payable	60,000.00		7,087,680.65	30,000.00	3,380,885.00	7,544,513.34
Accounts Payable	87,768.13	731,152.58	22,775.12	124,986.38	636,989.17	349,794.69
Interest and Taxes Accrued	287,323.55	938,582.40	8,615.86	334,252.78	928,898.86	677,240.32
Miscellaneous	61,533.21		22,585.17	62,549.96	161,626.26	579,167.95
Reserves	840,055.59	1,808,657.01	78,831.24	14,942.19	2,288,284.81	1,050,572.06
Corporate Surplus	366,189.39	3,378,281.92	487,328.39	269,359.29	664,511.66	674,216.83
Total Liabilities	$ 27,952,659.75	$ 98,878,673.91	$ 10,707,816.43	$ 20,305,090.60	$ 72,322,474.75	$ 77,829,415.17
INCOME AND PROFIT AND LOSS ACCOUNT						
Operating Revenue	$ 1,734,316.13	$ 6,682,201.32	$ 257,399.30	$ 2,057,601.65	$ 8,359,229.07	$ 4,898,707.71
Operating Expense	1,058,895.11	2,477,874.30	124,998.09	897,823.36	4,905,080.47	2,787,338.42
Net Operating Revenue	675,421.02	4,204,327.02	132,401.21	1,159,778.29	3,454,148.60	2,111,369.29
Non-operating Revenue	147,042.60	169,780.26	4,509.49	36,696.41	219,274.89	546,256.70
Gross Corporate Income	822,463.62	4,374,107.28	136,910.70	1,196,474.70	3,673,423.49	2,657,625.99
DEDUCTIONS						
Non-operating Revenue Deductions					$ 61,364.83	
Interest Accrued on Funded Debt	$ 261,354.17	1,656,843.53		$ 443,773.45	1,913,948.68	$ 1,178,300.00
Other Interest Deductions	162,116.83	148,833.56	$ 87,556.16	19,038.92	88,338.52	351,838.68
Rent Deductions					80,974.55[2]	
Miscellaneous Deductions	37,764.94	428,575.30		206,263.97	652,144.23	138,114.13
Total Deductions	$ 461,235.94	$ 2,234,252.39	$ 87,556.16	$ 669,076.34	$ 2,796,770.81	$ 1,668,252.81
Net Corporate Income for Year	$ 361,227.68	$ 2,139,854.89	$ 49,354.54	$ 527,398.36	$ 876,652.68	$ 989,373.18
Dividends	211,815.99	2,350,826.00	45,000.00	355,544.45		921,045.73
Miscellaneous Additions to Income				18,182.20	132,794.54	
Miscellaneous Deductions from Income			20,000.00[1]	26,500.00	898,656.82	
Surplus on Dec. 31, 1918	216,777.70	3,589,253.03	500,787.04	178,816.34	553,721.26	605,889.38
Surplus on Dec. 31, 1919	366,189.39	3,378,281.92	487,328.39	242,352.45	664,511.66	674,216.83

[1]Bond discount. [1]Replacement Reserve. [1]Street Improv. Bonds.
[2]Amortization of debt discount and expense.
[2]Includes Sinking Fund Assets.

enough for its service so that it can build up a reserve and surplus which will take care of its replacements and extensions as the territory which it serves expands and makes new demands upon it.

By all means get acquainted with the rates of the power company which serves you; get acquainted with their plans for expansion, their troubles in this day of rising prices and scarcity of labor, and become a booster for that company. Every time you hear anyone "grouse" at the "light company" take it as a personal affront and defend them as you would yourself. For on the stability of the central stations the entire electrical industry is founded and unless they are able to earn a living wage and have the confidence of the people the entire industry will suffer.

Remember that the interests of your local central station are your interests, and back them up mentally, morally and financially.

Back Up Your Local Power Company Financially

What the Central Station Men Think of the Plan of Distributing Stock Among the Other Branches of the Industry

A. Emory Wishon, assistant general manager of the San Joaquin Light & Power Corporation, and who is responsible for the "self-interest story" used in selling central station securities to consumers, has the following to say regarding the results obtained from the widespread sale of stock to consumers: "The work we have done has netted us results in the way of a more kindly public attitude to a greater degree than we had ever anticipated was possible, and each day the public is understanding better what the utility means to the community and what must be done in the way of allowing a fair return and protection to the utility in order that the utility may serve the community's best interests."

A. N. Kemp, vice-president of the Southern California Edison Company, in charge of security sales, one of the ablest comptrollers in the West, states that the sale of bonds has always been handled by the banks without any difficulty. However, "the thing that would really benefit us would be to have common stock purchased by our friends, as we figure on providing from one-quarter to one-third of our requirements through this means. We have in vogue now a plan for selling stock on monthly instalments of five dollars a share so that the machinery is already set up for such a plan as you have in mind."

A. F. Hockenbeamer, second vice-president of the Pacific Gas and Electric Company, who was responsible for the first widespread sale of central station securities to the consumers of that company, and one of the foremost financiers on the Pacific Coast, said: "The distribution of public utility securities, whether they be bonds or stocks, among the jobbers, manufacturers and contractor-dealers will undoubtedly help the industry, and we are very glad indeed to see the Journal of Electricity using its influence in the furtherance of this movement. We are firm believers in the value of a widespread distribution of our securities among the people living in our territory, as evidenced by the fact that we were the first public utility in the United States to put this theory into actual practice."

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, whose opinion on matters of policy and public relations is widely sought, said in regard to the wider distribution of bonds among members of the electrical industry: "Incidentally I may say that I believe that your conclusions are correct—that the time is coming when bonds to be attractive must take on very much the same character as stocks. It does seem to me that if our holdings, either stocks or bonds, were to be subscribed for liberally by the electrical fraternity, it would be a direct commendation to the company from a source that would be of great value. I will look forward with a great deal of pleasure to some interest being exhibited in our affairs by such a large and powerful organization as the manufacturers, jobbers and the contractor-dealers."

Franklin T. Griffith, president of the Portland Railway Light & Power Company and chairman of the Water Power Development Committee of the National Electric Light Association, who has a thorough knowledge of the needs of the West and the possibilities for its development, said: "I am heartily in favor of wide distribution of our securities and it certainly would be a strong recommendation to the small investor if the members of the electrical industry generally could be referred to as holders of the securities of such companies. In the sale of such securities to members of the industry the self-interest appeal should be made and should secure results."

F. M. Kerr, vice-president and general manager of the Montana Power Company, who is recognized as an authority on the supplying of power to electrified railroads by central stations, and who was chairman of the Committee on Railway Electrification at the recent N. E. L. A. convention at Pasadena, is heartily back of the plan to sell stocks of the power companies to members of the electrical industry. Mr. Kerr in speaking of the plan that has been suggested by the Electric Supply Jobbers' Association and adopted by the Journal of Electricity to secure a widespread sale of central station securities among men of the electrical industry, said: "I think the policy of getting local investors into the local power companies is a very good idea and one that should be very beneficial. I think that the power companies could really afford to pay more for their money than they would otherwise pay, in order to secure the local support."

SPARKS—Current Facts, Figures and Fancy

(After reading this page you will agree with us that letters and cows may soon be a convenience of the past and you will also know why we have the right to assert that horses are already passing into the realm of ancient history. Items on this page also tell how it takes a forest to produce a popular novel but only some properly applied air to double the production of electric steel.—The Editor.)

It is estimated that the oil wells of Mexico which are now under exploitation are capable of producing 1,000,000 barrels of petroleum per day.

* * *

The final farewell to the horse is coming not slow but sure. Already Denver has stated that after January, 1925, the faithful horse will no longer be allowed upon her streets.

* * *

It seems that forests must be sacrificed that literature may progress. No fewer than 500 trees must be cut down and worked up into paper for a novel that sells up to a quarter of a million copies.

* * *

Britain has launched her first electrically welded vessel. The ship is a 500-ton coaster, and in the construction of the hull, riveting has been entirely dispensed with, electric welding on the "quasi-arc" method taking its place.

* * *

It can truthfully be said, "The more asphalt pavement the better the city." And for this reason Buffalo has the right to hold her head very high, for she can claim the honor of having more asphalt pavement than any other city in the world.

* * *

Gasoline or no gasoline, the manufacture of motor vehicles goes on. Only 1,891,929 of these creatures were manufactured in this country last year while the estimated output for 1920 is 2,225,000 passenger vehicles and 425,000 motor trucks.

* * *

"Safety First" is by no means a slogan of the past, as will be seen by a glance at statistics showing that industrial accidents in a Western state last year caused the loss of 740,000 days' work, or the equivalent of the work of 1000 men for two and a half years.

* * *

A time saving of 25 to 50% in the production of electric steel has been accomplished by a recently developed method of blowing air into the solid charge of steel in the furnace. This corresponds to a reduction in energy consumption of between 150 and 250 kw-hrs.

* * *

In 1919 the world's gold production was over forty million dollars less than that of 1918. The figure for 1918 is $380,924,500 while that for 1919 is between $345,000,000 and $350,000,000. Information received during the first six months of 1920 indicates a still further decrease this year. The probable output of the United States is less than $5,000,000.

* * *

It seems that some men can be shocked and others can not. The story is being told of a certain Spaniard who enjoyed receiving a charge far higher than 7000 volts used in an American prison for the purpose of electrocution. He was also pleased to stand on a stage between two electrodes, and permitted a constant stream of lightning to pass through his body. And there are others. A man of Leicester is known to have handled parts of a dynamo that make the average man jump out of his boots.

* * *

It looks very much as though the peanut is to become a rival to the cow. Recent experiment has shown that our common, ordinary and popular little peanuts can be converted into four times their volume of milk, varying from four to eight per cent in fat content, and from 2.4 to 3.3 per cent in protein. This new product proves that it is truly milk in turning sour, curdling and allowing itself to be turned into cheese. The cost of production is said to be considerably less than the market price of dairy milk.

* * *

The latest in correspondence inventions carries with it a sad farewell to stenographers. This invention is the telegraphone which combines the principles of telephone, telegraph and phonograph so that one talks into the machine and the message is recorded on disk records of thin steel which have been given the name of "talking post cards." These are sent through the mail and "played" on the telegraphone of the recipient, who may erase the post card with a magnet and send it back with his return message.

* * *

It has been found that the generally useless seaweed is a nourishing and agreeable food for cattle. The plant is washed free of its salt and then treated with steam, preferably under high pressure, which causes the cells to burst and allows the protoplasm to come out. This mass is then placed under high pressure and formed into cakes, which are dried in a vacuum and ground into a coarse powder. The juice of the mass is boiled in a vacuum to a high grade of concentration, which causes the salts to crystallize, after which they are separated from the juice by means of a centrifugal separator. The juice is then mixed with the powder and the mixture pressed into cakes of suitable size.

PERSONALS

Wigginton E. Creed, president of the Pacific Gas & Electric Company, has recently succeeded Frank G. Drum in that position, the latter having retired after fifteen years due to the unusual demands of his other interests upon him. Mr. Creed is well known for his work in reorganizing the East Bay Water Company and also as president of the Hooper Lumber Company and as one of the founders of the Columbia Steel Company of Pittsburg, California. At the present time Mr. Creed is making a trip of inspection of the company's properties with John A. Britton, vice-president and general manager, and P. M. Downing, vice-president in charge of electric operations.

J. C. Thompson, formerly secretary of the California-Oregon Power Company, has been appointed manager of the Klamath division of the company with headquarters at Klamath Falls, Oregon.

George J. Walton, manager of the Klamath division, California-Oregon Power Company, has resigned his position with that company to become cashier of the First National Bank of Merrill, Oregon.

W. M. Rosborough, assistant to the Pacific Coast manager of the National Lamp Works, Oakland, has resigned his position with that company. Mr. Rosborough is going East to accept a position as vice-president of a large jobbing house.

Major Ulysses S. Grant, 3rd, United States Engineer Corps, has been appointed to replace **Col. William H. Kelly**, in charge of the internal waterways in the third engineering district. Col. Kelly has gone to Washington to serve on the Water Power Committee recently created.

Byron H. Hurd, assistant secretary of the California-Oregon Power Company, has been appointed acting secretary of the company with headquarters in San Francisco. The California-Oregon Power Company have just moved from 129 Leidesdorff Street in San Francisco to new and more spacious quarters at 507 Montgomery Street.

K. E. Van Kuran, Los Angeles manager of the Westinghouse Electric & Manufacturing Company, has in charge the open day session of the Pacific Coast Electrical Supply Jobbers' Association, which will convene at Del Monte the latter part of November next. It is expected that the meeting will prove interesting and beneficial to an unusual degree, in that plans are already being laid for its consummation.

H. H. Bliss, State Supervisor of Trade and Industrial Education of the state of Nevada, and formerly in charge of Extension engineering courses for the University of California, has resigned his position with the state of Nevada and after September the fifteenth will be with the Riverside Junior College at Riverside, California. Mr. Bliss is the author of the series, Problem Course in Electricity, which is now running in the Journal of Electricity.

C. C. Hillis, vice-president and treasurer of the Electric Appliance Company, San Francisco, is largely responsible for the effort being made by the Electric Supply Jobbers' Association to sell central station securities to members of the electrical industry. His talk at the spring meeting of the association led to the questionnaires which were sent out by the Journal of Electricity which form the basis of the article appearing in another part of this issue.

L. A. Somers, managing director of the San Francisco office of the Coast Equipment Company, has just returned from a 60-day trip to factories his company represents in Chicago, Pittsburgh, Ridgway, New York, Norwalk, Boston, Cleveland and Milwaukee. Mr. Somers reports all of these factories well supplied with orders, but great difficulty was experienced in securing coal, steel and cars in which to ship the manufactured product. In some cities there was a serious shortage of unskilled labor.

Capt. H. M. Gleeson, construction corps, United States Navy, who has been stationed at Mare Island Navy Yards for the past ten years, has sent in his resignation to the Secretary of the Navy to take effect at once. Capt. Gleeson has had immediate charge of the building of twenty-two vessels during the time that he has been stationed at Mare Island, including the battleship California. He is regarded as one of the most distinguished mechanical engineers of today in the field of shipbuilding and naval construction.

Clayton H. Sharp, technical director of the Electric Testing Laboratory, New York, and chairman of the Headlight Specification Committee of the Illuminating Engineering Society, is attending the International Traffic Officers' Convention at San Francisco. Dr. Sharp addressed the convention on the proper regulation of headlights and the Bay Cities Chapter of the Illuminating Engineering Society on accomplishments of the I. E. S. Dr. Sharp is one of the founders of this society and has always taken an active part in the work to make better lighting conditions.

S. M. Kennedy, vice-president of the Southern California Edison Company, Los Angeles, was present at the fall meeting of the Pacific Division of the Electric Supply Jobbers' Association, Del Monte, and highly endorsed the jobbers for the work that they have undertaken in helping the power companies finance themselves. Mr. Kennedy stated that the meeting of the jobbers which he attended was the most successful he had ever attended and that he was strongly behind their movement for securing a widespread distribution of central station securities among the members of the electrical industry.

R. H. Ballard, vice-president and general manager of the Southern California Edison Company and last year's president of the Pacific Coast Section of the National Electric Light Association, has been appointed chairman of the Public Relations Section of the Pacific Coast Division of that Association. Mr. Ballard has also been appointed one of the four gentlemen from that committee to be a member of the public policy committee, the other three being John F. Gilchrist, Commonwealth Edison Company, Chicago, M. S. Sloan, The Brooklyn Edison Company, Brooklyn, New York, and J. E. David, Nebraska Power Company, Omaha, Nebraska.

John B. Fisken, consulting engineer, the Washington Water Power Company, Spokane, has just been appointed chairman of the Sections Committee of the American Institute of Electrical Engineers. Mr. Fisken is also president of the Northwest Electric Light and Power Association convening in Spokane September 8th to 11th, and he deserves special credit for the work that has been done in the association during the past year. The executive ability of Mr. Fisken has been demonstrated many times and this quality will assure the Sections Committee of the A. I. E. E. of an unusually successful year under his leadership.

Frank A. Leach, Jr., assistant general manager of the Pacific Gas and Electric Company, has been promoted to that position recently after twenty-two years of service with the company. Mr. Leach was formerly manager of Alameda district which is one of the largest in the company's territory, embracing as it does all of Alameda and Contra Costa counties. Mr. Leach has been very active in civic affairs and was one of the first presidents of the Oakland Chamber of Commerce and one of the directors of the First National Bank of Oakland. His recent promotion is in recognition of the excellent manner in which he has managed the district for the past sixteen years and the esprit de corps which he has built up among the employes working with him.

J. F. Ryan, sales manager of the Western Electric Company at Portland, is spending his vacation in Alaska.

Emmet N. Britton, formerly associate editor of the Journal of Electricity, has been given the title of managing editor.

J. H. Graef, sales engineer with the Western Electric Company, has been transferred from the Seattle to the Portland office.

L. D. Morgan, lighting specialist, Western Electric Company, Seattle, attended the N. E. L. A. lamp convention held at Cleveland recently.

A. D. Williams, superintendent of motive power with the Southern Pacific Company at Sacramento, was a recent San Francisco visitor.

G. B. Kirker, manager railway department, Westinghouse Electric & Manufacturing Company, Los Angeles, was a recent visitor in San Francisco.

Alan W. Eshelby, Westinghouse Electric & Manufacturing Company, Seattle, Wash., has returned home after spending several days in San Francisco.

A. B. West, general manager, and **E. B. Criddle**, general agent, of the Southern Sierras Power Company with headquarters at Riverside, California, are recent San Francisco visitors.

H. B. Michner, stores manager of the Western Electric Company, Seattle offices, recently returned to Seattle from a trip to Chicago where he attended a conference of stores managers.

E. J. DesCamp, power apparatus specialist, Western Electric Company, identified with the Seattle offices, is back home after attending the power apparatus convention recently held in New York.

Francis C. Pratt, vice-president of the General Electric Company, with his family recently spent a few days in Portland. Mr. Pratt is making a tour of the Northwest on a combined business and vacation trip.

H. S. Jones, Robbins & Myers Company, San Francisco, has left for the East where he will spend some time at the company's factory at Springfield, Ohio, getting acquainted with their manufacturing methods.

Albert H. Elliot, secretary of the Pacific Division, Electric Supply Jobbers' Association, delivered an address at the recent convention of the National Traffic Officers on the subject of "Internationalization of Traffic Laws."

C. E. Magnusson, professor of electrical engineering and acting dean of the college of engineering at the University of Washington, has been appointed chairman of the Educational Committee of the American Institute of Electrical Engineers.

W. A. Louy, special representative of the Conlan Washer Machine Company of Chicago, recently completed a month's work in the Northwest in sales promotion effort. He reports being well satisfied with results attained.

F. G. Parker, formerly assistant superintendent of distribution of the Northwestern Electric Company, has been made secretary of the Portland Joint Pole Committee, to fill the vacancy created by the illness of Mr. James Curran.

D. G. Hayes has accepted the position of cashier at the local office of the Western Colorado Power Company. Mr. Hayes has been located at the Durango office of the same company and previous to coming to Colorado was with the Westinghouse Electric & Manufacturing Company for eight years.

James Scrugham, state engineer of Nevada, has been appointed water master for the Truckee river district by Judge Farrington of the federal court. The creation of this new office of water master assures the delivery to Fernley farmers of such water as may be obtained from Lake Tahoe by the Reclamation Service.

H. J. MacIntire, formerly professor of chemical engineering at the University of Idaho, has entered the Department of Mechanical Engineering at the University of Illinois at Urbana, Illinois. Professor MacIntire has been a recent visitor at San Francisco, Seattle and other Pacific Coast points preparatory to leaving for his eastern duties.

R. H. Ballard, vice-president and general manager of the Southern California Edison Company, **A. C. Balch**, vice-president of the San Joaquin Light & Power Corporation, and **A. E. Wishon**, assistant general manager of the San Joaquin Light & Power Corporation, were in San Francisco recently attending a conference with the State Railroad Commission.

J. M. Buswell, general agent for the San Joaquin Light & Power Corporation, was the author of the interesting article, "Making Ice Cream Electrically," which appeared unsigned in the last issue of the Journal of Electricity. Mr. Buswell's work brings him into close touch with the many industrial users of electricity in the San Joaquin valley, and another contribution by him on a similar subject will appear in an early issue.

Walter C. Heston, industrial engineer with the Portland Railway Light & Power Company, has recently become associated with the Journal of Electricity as Northwest correspondent in Portland, Ore. Mr. Heston is secretary of the Portland section of the American Institute of Electrical Engineers, and has been very active in the affairs of the A. I. E. E. in the Northwest. He was in part responsible for the great success of the recent convention of the Institute at Portland, taking an energetic part in the arrangements for the event. His affiliations keep him in particularly close contact with the engineering activities of the Northwest, and the Journal of Electricity is glad to be able still further to improve its service through this new connection.

OBITUARY

General William Marshall, Corps of Engineers, United States Army, died recently in Washington, D. C. General Marshall at the time of his retirement was Chief of Engineers and immediately afterwards became consulting engineer for the Secretary of the Interior. He was a lover of the great West and discovered the pass over the Rockies in Colorado which now bears his name.

Meeting Notices for Electrical Men

(The newly formed Rocky Mountain Division of the N. E. L. A. was actually put into operation at the first meeting of its Executive Committee which is reported in full below. A detailed account is also given of the regular quarterly meeting of the Pacific Division of the Electrical Supply Jobbers' Association. In view of the forthcoming Spokane convention, the account here given of the meetings of the committees of the Northwest Electric Light and Power Association is of especial significance.—The Editor.)

Rocky Mountain Division, N. E. L. A.

The Executive Committee of the Rocky Mountain Division of the National Electric Light Association held its first meeting at the Denver Athletic Club, Tuesday, August 3rd. There were present E. A. Phinney, president, A. C. Cornell, secretary-treasurer, C. D. McClure, Denver, Colorado, Arthur Prager, Albuquerque, New Mexico, and E. P. Bacon, Casper, Wyoming.

The constitution for this Division was adopted subject to the approval of the National Electric Light Association. A copy of the proof of this constitution will be forwarded to the Executive Manager within a few days.

The following appointments for divisional chairmen for the special sections were made:

Public Relations Section: Mr. Bulkeley Wells, president, Western Colorado Power Co., Denver, Colo.

Technical Section: Mr. T. O. Kennedy, general superintendent, The Denver Gas & Electric Light Co., Denver.

Commercial Section: Mr. C. N. Stannard, secretary and commercial manager, Denver Gas & Electric Light Company, Denver.

Accounting Section: Mr. Charles E. Twogood, Albuquerque Gas & Electric Co., Albuquerque, New Mexico.

The chairmen of the above committees are to appoint their own committeemen, one from each state represented in the Division.

It was decided to hold a joint convention of the Rocky Mountain Division, N. E. L. A., with the Colorado Electric Light, Power and Railway Association at the Hotel Colorado, Glenwood Springs, Colo., Monday, Tuesday and Wednesday, Sept. 13, 14 and 15. Matters of general interest are to be discussed at the joint convention, but each organization is to hold separate business sessions.

The president presented a letter from Mr. Martin J. Insull, president of the National Electric Light Association, practically assuring Mr. Insull's presence at the convention above mentioned. Elaborate plans are being made to make this convention a great success.

Mr. A. C. Cornell, secretary and treasurer of the Rocky Mountain Division, and Denver salesman of the Western Electric Company, entertained the executive committee at a luncheon at the Denver Athletic Club.

Mr. E. A. Phinney, president of the Rocky Mountain Division, entertained the members of the executive committee and a number of operating executives and representatives of manufacturers and jobbers at a dinner at the new Troutdale Hotel, in Bear Creek Canyon.

Jobbers Meet at Del Monte

The regular quarterly meeting of the Pacific Division of the Electrical Supply Jobbers' Association was held at Del Monte in the early part of August. Due to the fact that it was vacation time and the meeting followed so close on the heels of the big convention that was held there in May, and the N. E. L. A. convention the same month, the attendance was very light.

The first two days of the meeting were devoted to the business of the association and on Saturday morning a general meeting was held at which three excellent papers were presented. The first paper was by W. M. Deming, on "What Is the Present Financial Outlook?" Mr. Deming's conclusions that the electrical industry was on a firm footing were drawn from the answers to questionnaires that had been sent out to the leading manufacturers of electrical appliances, wire, motors, and to typical business and banking institutions throughout the United States.

The second paper, by A. M. Irwin, assistant to the treasurer, Westinghouse Electric & Manufacturing Company, dealt with the "Credit Situation" and put particular stress on conditions on the Pacific Coast. He stated that while the banks are calling in loans, there is plenty of money for anyone engaged in a business that supplies essentials. The only businesses that are finding it difficult to obtain extended credit are those engaged in the manufacture of luxuries.

Robert Sibley, editor of the Journal of Electricity, presented the third paper, which dealt with "The Financing of Central Station Securities." In delivering his paper Mr. Sibley quoted from letters which he has received from presidents and general managers of the largest power companies in the West, stating that the plan for the sale of central station securities to the men of the electrical industry supplied by that central station is one of the greatest movements ever started, for while the material gain will be small the result will be far-reaching as it will show the public a united industry which has confidence in itself. This confidence is bound to be felt by the public who will see that the development of the West depends upon the development of its hydroelectric resources.

In the golf tournament the prizes won were as follows: Deming trophy—won by W. B. Sawyer, Jr., sales engineer, U. S. Steel Products Company, San Francisco; Turner trophy—tie between A. M. Irwin, assistant to the treasurer, Westinghouse Electric & Manufacturing Company, and W. M. Deming, Pacific Coast manager, McGraw-Hill Company; The Old Copper Cup was won by C. C. Hillis, vice-president and treaurer, Electric Appliance Company, while L. H. Newbert,

BUILDERS OF THE WEST — LXXXIV

WILLIAM G. KERCKHOFF

By the vision of those Western financiers who saw the possibilities in desert lands and mountain snows and who had the courage to build by this faith is Western accomplishment to be measured. To William G. Kerckhoff, sponsor of the newly opened Kerckhoff Power Project, president of the San Joaquin Light & Power Corporation, to whose keen visualization of the latent values of the San Joaquin Valley and the services which electricity might render in its upbuilding, much of the present development of this fertile region may be credited, this issue of the Journal of Electricity is affectionately dedicated.

manager of the commercial department, Pacific Gas & Electric Company, won the Central Station trophy.

The following members attended the meeting:

E. G. Alexander, Alexander & Lavenson, San Francisco.
W. S. Berry, Western Electric Company, San Francisco.
T. E. Bibbins, Pacific States Electric Company, San Francisco.
J. O. Case, local sales manager, General Electric Company, Los Angeles.
H. H. Daley and wife, Majestic Electric Development Co., San Francisco.
R. J. Davis, local representative, Century Electric Motors Company, San Francisco.
W. M. Deming and wife, McGraw-Hill Company, Inc.
L. W. Davis, branch manager, Westinghouse Lamp Company, Los Angeles.
A. H. Elliot, attorney-at-law, San Francisco.
N. W. Graham, Graham-Reynolds Company, Los Angeles.
Phil Gough, Listenwalter & Gough, Los Angeles.
H. L. Garbutt, manager supply division, Westinghouse Electric & Manufacturing Company, San Francisco.
C. M. Gifford, Westinghouse Lamp Company, San Francisco.
C. B. Hall, Illinois Electric Company, Los Angeles.
D. E. Harris, Pacific States Electric Company, San Francisco.
C. C. Hillis, Electric Appliance Company, San Francisco.
R. D. Holterman, manager Holabird Electric Company, San Francisco.
A. M. Irwin, assistant treasurer, Westinghouse Electric & Manufacturing Company, San Francisco.
R. F. Oakes, National Carbon Company, San Francisco.
H. L. Randall, Capital Electric Company, Salt Lake City, Utah.
H. E. Sanderson and wife, Bryant Electric Company, San Francisco.
W. B. Sawyer, Jr., sales engineer, U. S. Steel Products Company, San Francisco.
H. B. Squires, president and manager, H. B. Squires Company, San Francisco.
Robert Sibley, editor, Journal of Electricity.
S. H. Taylor, Electric and Manufacturers' Supply Company.
H. W. Turner, Montana Electric Company, Butte, Mont.
K. E. Van Kuran, district manager, Westinghouse Electric & Manufacturing Company, Los Angeles.
C. E. Wiggin, manager electric department, Dunham, Carrigan & Hayden Company, San Francisco.
W. C. Wurfel, Westinghouse Lamp Company, San Francisco.
S. M. Kennedy, Southern California Edison Company.

Meeting of Northwest Electric Light and Power Association Committees

Special Committee —

A meeting was held on Wednesday, August 11, in Portland, of a special committee to report to the forthcoming annual convention in Spokane on revision of the constitution of the Northwest Association.

The principal object of the revision is to make the association year run concurrently with the N. E. L. A. year so that the representation on the N. E. L. A. committees from the Northwest Association committees may run concurrently as to terms and personnel. This will make the association year commence from July 1, and probably necessitate the annual convention being held during June instead of September.

The constitution follows as closely as possible the N. E. L. A. constitution, with certain exceptions to fit conditions peculiar to the Northwest.

Under the proposed revision the executive committee is to be constituted as at present, with the exception of the addition of the chairman of the executive committee of each of the sections, these sections being accounting, commercial, public relations and technical. The Hydroelectric and Technical Section has been designated as the Technical Section.

The election of officers at the annual convention will mean the election of an entirely new personnel.

Executive Committee Meeting —

The executive committee met on Thursday, August 12, the two questions of major importance being, first, acceptance by the committee of the report of the advisory committee of the governing committee of the commercial section, with reference to organization of the "Northwest Electrical Service League," to promote closer cooperation between the central stations, the contractor-dealer, the jobbers and the manufacturers, based largely upon the so-called "California Cooperative Plan." This report will be recommended for adoption by Class A members at the annual convention.

The second subject of importance was the report of the special committee on revisions to the constitution. The executive committee approved the report of this committee with certain modifications. It was proposed by the special committee that the executive officers should be chosen by a referendum vote of Class A members; this proposal was not accepted, and the present method was indorsed.

Other matters of detail having to do with the annual convention and routine matters were considered.

Membership Committee —

On Friday, August 13, there was a meeting of the membership committee to formulate its report for the forthcoming convention, which will contain a report of progress and recommendations of ways and means of increasing membership.

San Francisco Electrical Retail Dealers Hear Sales Talk

The San Francisco members of the California State Association of Electrical Contractors and Dealers who are in the retail dealers' section met on the evening of August 4th. The speaker of the evening was M. Meyers, retail sales manager of Nathan Dohrmann Company, who spoke on "Some Phases of Retail Merchandising and the Business Outlook." Mr. Meyers took up the relation of each article of merchandise in the store to the entire stock, and the question of a fair margin of profit. Store organization and management, credits, methods of attracting business, including advertising, were some of the points touched by Mr. Meyers. By a series of actual figures he showed the necessity of paying special attention to small leaks, waste and breakage, and the effect that these had upon profit. There was a very enthusiastic discussion on several of the points brought out by Mr. Meyers, who took part in the discussion and willingly answered all the questions that were put to him.

A committee was appointed to arrange for another meeting in the near future, and to arrange for some other speaker to present a topic that would make for better merchandising methods. It is expected that all of the San Francisco members of the retail section of the state Contractor-Dealers' Association will attend the next meeting on account of the enthusiasm resulting from this meeting, which was held with the idea of making such meetings a regular institution provided enough interest was shown to make it worth while.

Meeting of the Utah Section, A. I. E. E.

A special meeting of the Utah Section of the A. I. E. E. at the Commercial Club, Salt Lake City, was held on August 16th. Mr. H. T. Plumb, General Electric Company, Salt Lake City, reported that at the Pacific Coast convention of the Institute a motion had been carried the sense of which was that the annual convention should meet conjointly with the Pacific Coast convention in 1921 in Salt Lake City. Mr. Plumb then offered the following motion: "That the secretary be instructed to write a letter to Mr. Hutchinson which can be submitted to the Board of Managers of the A. I. E. E. inviting them to hold the next annual convention in Salt Lake City in conjunction with the Pacific Coast convention." Mr. F. L. Hutchinson, secretary of the American Institute of Electrical Engineers, then spoke on the subject of "Institute Activities."

Advisory Committee, California Cooperative Campaign

At the last meeting of the Advisory Committee of the California Cooperative Campaign it was announced that besides the electrical homes established in San Francisco, Oakland and Sacramento, plans had been made for similar homes in Stockton, Fresno, Bakersfield, Los Angeles, Long Beach and San Diego. The newspapers of these cities cover in a satisfactory manner the entire state of California and appeal directly to the large centers of population. It is estimated that $20,000 will be spent in advertising these homes, of which the subdividers will spend $12,000 and the electrical interests $8,000. It is estimated that more than 200,000 people will visit these homes. It is the purpose of the Advisory Committee to finish the electrical home campaign by December in order to secure the maximum effect on the Christmas shopping.

HAPPENINGS IN THE INDUSTRY

GREAT WESTERN POWER COMPANY BOND ISSUE

An order which has been issued by the Railroad Commission authorizes the Great Western Power Company of California to issue $3,500,000 of 8% ten-year bonds. The proceeds will be used to defray the cost of completing the Caribou power development on the Feather River and the transmission line from the Caribou plant to Valona, Contra Costa county. It was originally estimated that the cost of the Caribou plant and the transmission line would total $6,057,430. Today it is estimated that the total will reach $10,674,897.66, an increase of $4,617,467.66. According to the evidence submitted with the application the increase is due to enlarging the tunnels so as to permit of the construction of an 80,000 kilowatt plant instead of a 60,000 kilowatt plant as originally planned and to unforeseen difficulties experienced in tunnel construction. Increases in cost of materials and supplies, increases in wages and difficulty in keeping employes permanently engaged on the construction work are also given as reasons for the additional cost.

This latest addition of two units in the new Caribou plant, which will be put into operation early in 1921, will bring the total capacity of the system up to 139,500 kw. This means a growth in the past twelve years which trebles its earlier capacity.

This is but the first step in a plan of progress which will eventually bring the development along the Feather River to a total of 486,000 kw., or about 640,000 hp.

NEW FINANCING BY PACIFIC POWER & LIGHT COMPANY

The Pacific Power & Light Company, with main offices at Portland, Oregon, has made a new issue of 8%, 10 year bonds to mature in 1930, for $1,000,000, which are secured by a mortgage on the company's property and business, subject to its present mortgage, and is also secured by deposit of a like amount of the company's bonds issued under the present mortgage.

The bonds were purchased by the N. W. Langley & Company bond house of New York, and are being handled locally by Blythe Witter & Co., Ladd & Tilton Bank, Freeman Smith & Camp, Lumberman's Trust Company and E. L. Devereaux & Company.

The price is $98.25, to yield the investor 8¼%. Half a million dollars of the money is to be used to take care of the company's present floating indebtedness for improvements and the other half-million dollars is to pay for the new steam electric generating station at Astoria. It is understood that this money cost the company in the neighborhood of 10%.

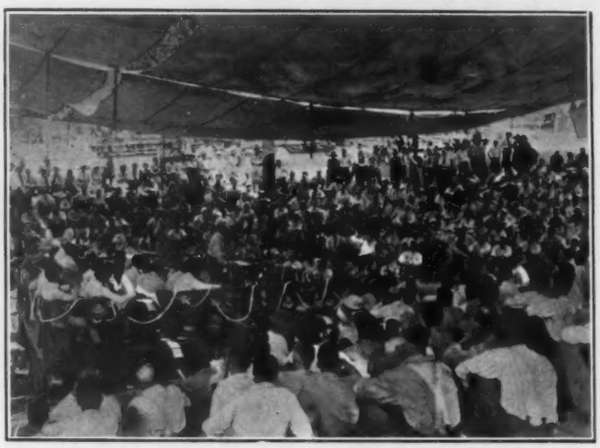
RATE INCREASE GRANTED COAST VALLEYS GAS AND ELECTRIC COMPANY

An increase of 15% in its charges for electric energy for power purposes has been allowed the Coast Valleys Gas and Electric Company by the Railroad Commission. The company's lighting rates are not changed. The new rate is to be collected on and after August 13 for a period of nine months, this being the time that the Coast Valleys Company will have to pay 15% more for the power it purchases in accordance with a recent decision by the Commission establishing an emergency rate to be collected by the Pacific Gas & Electric Company which sells to the Coast Valleys. The increase is in the nature of a surcharge. It is estimated that the new rate will result in an increase in revenue of approximately $22,000 during the nine months.

KERCKHOFF POWER PROJECT IS COMPLETED

The Kerckhoff power plant of the San Joaquin Light & Power Corporation, which is situated on the San Joaquin River near Auberry, about thirty miles from Fresno, was opened on the fifteenth of August with ceremonies in which the electrical men of the state and the general public took part. The maximum output of the plant amounts to 50,000 horsepower. It was constructed at a cost of approximately $5,500,000.

It is claimed that the erection of the project has been accomplished in record time, the entire project being completed and placed in operation in less than fifteen months from the time the first work was begun.



Colonel Harvey D. Loveland, of the Railroad Commission of California, addressing the gathering at the opening of Kerckhoff power house. Only a few of the 2,280 people in attendance could be caught by the camera. Colonel Loveland is telling his listeners that if they accept General Manager Wishon's invitation to become partners with him in the San Joaquin Light & Power Corporation, they will occupy the unique although advantageous position of being at the same time the boss of the Railroad Commission and likewise under its jurisdiction and subject to its regulation.

The construction work has included the erection of a dam 104 feet high in the San Joaquin River, the driving of a tunnel 17 by 17 feet through solid granite for a distance of about four miles, and the erection of a power house and conveyor pipes at the end of the tunnel line. In addition to being one of the largest projects in the state, it is the first to be started and completed since the war. A lake has been created 3½ miles in length, which will be kept continually full to provide the power.

More than 2000 persons attended the opening ceremonies at which time William G. Kerckhoff, president of the San Joaquin Light & Power Corporation, opened the switch putting the plant on the line. He was assisted by Rex Starr, Jr., son of Construction Engineer Starr.

Pamphlets descriptive of the project were dropped from the airplane fleet of the local forestry air patrol which later landed at Auberry, at which time the public was permitted to use the wireless telephones. Visitors were escorted and directed over the entire project by employes of the San Joaquin Light & Power Corporation.

The Fresno Republican commented upon the task which has been accomplished in an editorial appearing under the title, "Not By Luck," excerpts of which appear below:

When timely rains relieved the threatened spring water shortage, we attributed it according to our respective degrees of piety, to luck or

providence. Now that timely electricity relieves the late summer shortage, by starting thousands of pumping plants, many of us will give it not much more thought. * * *

The fact is that it was not luck or providence, but grit and desperate effort, that relieved the shortage. There was natural gas enough in Bakersfield fields, but no machinery to turn it into electricity. There was flowing water enough in the larger Sierra streams, the Kings and San Joaquin rivers, but there was no way to make it available. * * * So the officials and engineers of the San Joaquin Light & Power Corporation set themselves to accomplish the impossible. Out of a tightening money market, with no money to be had, they somehow raised the money. Out of a machinery market in which everything was over-ordered for more than a year ahead and quick delivery on nothing could be had, they somehow did get engines and dynamos and pipes, and the steam plants, burning natural gas and oil, are now working.

In the Sierra, the task was more impossible. Between the San Joaquin river and its effective use lay three miles and a half of solid granite mountain. Granite can be tunneled, but only at a certain speed, and at the highest speed ever known the tunnel could not be completed until long after the calamity would have happened. * * * Steam shovels were set to building roads, and pipes laid to water those roads and keep them passable. Preliminary machinery was dragged bodily over the mountain sides before the roads were ready. A great dam was built across the San Joaquin river while that river was running, between almost vertical walls of solid granite. Tunneling was started from several points at once, all so accurately surveyed that each section joined perfectly to every other, when they met. Twenty-four hours a day, month after month, without an instant's stop, men worked day and night, not at a walk, but at a racing run. New machinery and methods were invented, to make results swifter.

So the tunnel was finished a month ahead of even the rush schedule. A location was selected where the descending pipe lines and the outlet to the lower river could best be brought together. There was no place to build a power house, so one was blasted out of the solid granite, in the mountain. Then the whole San Joaquin river was turned through the tunnel, leaving eight miles of its bed dry; it was imprisoned in great steel pipes anchored to the mountain side; through concealed nozzles it dashes under almost explosive pressure against the blades of great horizontal Pelton wheels; these wheels turn great generators which send the released power of the river down tiny wires to the fields and factories of central California—and the river flows out of outlets below and continues its way as if nothing had happened, to the irrigated fields or to the sea.

For the future, everything is as simple as turning a switch and letting the river flow. But to make it simple and easy, and to deliver it quick, has been a desperately hard and complicated task.

NEW POWER RESTRICTIONS FOR CALIFORNIA

Following a conference with representatives of power companies at which was discussed at length the serious power situation in northern and central California, the acuteness of the situation and the need for drastic action was recognized by the utility representatives, all of whom gave it as their opinion that serious consequences would follow failure to meet the situation immediately. As a result of the conference H. G. Butler, power administrator of the California Railroad Commission, issued the following order, effective August 20, 1920:

"(1) The use of electric energy for power purposes, except for domestic use and use in connection with growing crops and handling of perishable foods, shall be reduced 20%.

"(2) The use of electric energy for the irrigation of vacant lands and of lands from which crops have already been harvested shall not be permitted during the present shortage.

"(3) The attention of consumers of power for the irrigation of growing crops shall be called to the fact that unless a large reduction is voluntarily made drastic restrictions will become necessary.

"(4) The power companies shall direct the attention of city officials in their territory to the fact that electric energy used in street, sign and display lighting is being lost for productive purposes, and shall urge them to restrict this use as far as may be consistent with public safety.

"(5) The above reductions in the use of electric energy shall be made, as far as possible, between the hours of 7 a.m. and 10 p.m.

"(6) The power companies shall insert in all papers published in the territory they serve an advertisement referring to this order, calling attention to the power shortage, and urging consumers to conserve electricity used for any purpose in every way possible."

The order will be sent to thirty power companies, large and small, operating in the northern and central part of California, and a copy will be mailed to the five municipalities that sell electricity for the purpose of calling the attention of city officials to the grave situation caused by the power shortage.

At the conference, which was held in the rooms of the Railroad Commission August 19, the opinion was expressed that as the agriculturists of the state had already borne a share of the burden imposed by the power shortage they should not at this time be required to do other than to continue their cooperation by following the restrictions already in force, except in cases where vacant lands or lands on which crops had been matured were being irrigated.

It was practically agreed that it was necessary that the curtailment now ordered should fall on all industries, which includes street railways, the administration of the order being left to the power companies because of their familiarity with conditions in the various districts.

As a further means of curtailment the resale companies were directed to file with the Power Administrator all applications for new power above 2½ horsepower, the administrator to determine whether the power asked was for an essential industry. This practice has been followed by the generating companies for some time.

MANY SHOWS TO BE STAGED IN SEPTEMBER

Plans of the Western Electric Company are practically completed for shows to be staged during the month of September at the Eastern Washington Fair, Spokane; Washington State Fair, Yakima; Walla Walla County Fair at Walla Walla, and the Oregon State Fair at Salem. Also, local distributors or agents in the districts contiguous to the larger cities will stage demonstrations at approximately twenty smaller fairs during the fall months.

Low voltage power and light outfits, commonly called farm lighting plants, and household appliances for farm use will be exhibited and demonstrated.

ELECTRICAL PLANT IN CHINA

There is a growing demand for electrical plants and machinery in China, according to the figures just presented to the rate-payers of Shanghai by the engineer-in-chief of the electricity department of the Municipal Council. One of the most interesting features of the report is that which deals with the growth of the demand for current for both lighting and power.

In December, 1918, the engineer-in-chief reported on the probable demands over a period of six years ahead. This estimate was as follows:

Year	Estimated Demand
1919	29,000 kilowatts
1920	24,000 kilowatts
1921	39,000 kilowatts
1922	45,000 kilowatts
1923	53,000 kilowatts
1924	58,000 kilowatts

In the same period the engineer-in-chief considered the capacity of the plant should be increased from 38,000 kilowatts in 1919 to 83,000 or 103,000 kilowatts in 1924. Since that report was issued the demand for current and the growth of Shanghai have been such that one year later—December, 1919—the engineer-in-chief is compelled to revise his previous estimates as follows:

Year	Estimated Demand
1919	29,000 kilowatts
1920	45,000 kilowatts
1921	64,000 kilowatts
1922	80,000 kilowatts

PORTLAND IS HOST TO SHRINERS

Electricity played a dominant role in the success of the mammoth Shrine convention held in Portland the latter part of June, when 75,000 Shriners from all corners of the country trekked the hot sands to the oasis Portland to attend the annual convention of the A. O. N. M. S., which was declared to have been the largest and most successful convention in the history of Shrinedom.

The above shows how the lamp posts on the streets of Portland were converted into a grove of palm trees

Portland was bedecked in gala attire in honor of the coming of the Nobles of the Mystic Shrine, many unusual and striking decorative features embodying the Shrine emblem and colors, having been worked out.

Ornamental lamp posts were converted into palm trees; streamers with translucent fezzes, with an electric light inside, were suspended at intervals of 25 feet over the streets throughout the business section; the bridges over the river and many of the office buildings were outlined with colored lights; colored steam jets; the Shrine emblem worked out in the form of electric signs; an electric parade with 15 magnificent electric floats, etc., all combined to make a gorgeous illuminating effect.

Visitors to the city during the convention numbered over 100,000.

Seventy-five special trans were required to move the delegates to and from the convention, making a special train arriving and departing, before and after the convention, on an average of every twenty minutes.

A special Shrine telephone exchange handling an average of a call every second during the 24 hours of the day,

The great Shrine arch erected across one of the main streets made a dramatic entrance to an elaborately bedecked and lighted section of the city. The use of colored electric lights and steam jets increased the beauty of this arch during the evening hours.

connected the various Shrine headquarters, the special trains and the exchanges of the local Bell system.

Seventy-five special trains were required to move the drilling en masse on Multnomah Field, presenting a most gorgeous spectacle, and said to be the largest aggregation of uniformed bands ever assembled.

An evening dress parade requiring three hours to pass a given point. The Al Kader temple of Portland had the largest representation in this parade, having over 1000 marchers all in full dress suits.

FEDERAL POWER COMMISSION HOLDS CONFERENCE

The recently formed Federal Power Commission is holding a conference at the present time with outside advisers, for the purpose of aiding in drafting rules and regulations and forms of applications and permits to be used by the Commission. The N. E. L. A. was represented by Franklin T. Griffith, president of the Portland Railway, Light and Power Co.; W. A. Brackenridge, vice-president of the Southern California Edison Co.; G. W. Talbot, president of the Pacific Power and Light Co., and other members of the Water Power Development Committee. Among others who attended or were represented at the conference were: Newton D. Baker, Secretary of War; John B. Payne, Secretary of the Interior; Edwin T. Meredith, Secretary of Agriculture; Major-General Enoch H. Crowder, Judge Advocate General, and Major L. W. Call, who is acting as counsel for the commission.

The responsibility for much of the detailed administration of the Water Power Bill will rest with Oscar C. Merrill, formerly chief engineer of the Forest Service, who has been appointed executive secretary of the commission, and the engineering surveys will be placed in the hands of Lt.-Col. William Kelly, engineer officer of the commission. Both of these men are well known throughout the West, Mr. Merrill for the work accomplished while in the forest service in charge of the Western District, and Colonel Kelly for the great work done while in charge of inland waterways in the Western Department of the United States Army.

COURSES IN TECHNICAL SUBJECTS

Chemistry, electricity, shopwork—three courses of practical laboratory training in technical subjects, are being given by the Extension Division of the University of California in San Francisco. The classes meet in the San Francisco Polytechnic High School, Frederick Street near First Avenue, the instruction is given by teachers of the high school and the modern and extensive equipment of the high school's laboratories and work shops is being placed at the disposal of the extension classes. As the students in these three subjects receive chiefly individual attention from the instructors, it is necessary to limit the classes and registrations should be made at once at the San Francisco office of University Extension, 140 Kearny Street.

The class in electricity is under the instruction of Arthur L. Jordan. The class is studying Direct Current electricity, and meets on Tuesday and Friday evenings at 8:15.

The chemistry course, under the instruction of Miss Edith L. Brown, started on Tuesday evening, August 24. This will be a five weeks' course, the class meeting Tuesday and Friday evenings for two-hour sessions.

The shop work class was started on Monday evening, August 24th, with Ralph Weaver as instructor. In this course individual instruction is given and is so arranged that the beginner and the expert machinist may work side by side, each receiving from the instructor directions for the solving of his particular problem and each given the special training, elementary or advanced, that he most needs.

NATIONAL PARKS AND POWER PERMITS

According to a recent ruling of the Federal Power Commission, no permits will be granted within the boundaries of a national park until the opinion of Congress is given on the subject.

The passage and approval by the President of the water-power bill is considered by Robert S. Yard, executive secretary of the National Parks Association, as most unhappy for the parks. He declares that Congress has turned its power over to three men but states, however, that "under the present administration the parks are probably safe."

ADVISORY COMMITTEE OF NORTHWEST ELECTRIC LIGHT ASSOCIATION PRESENTS REPORT

The advisory committee of the Northwest Electric Light Association has presented a formal report and recommendation to the Northwest Light and Power Association that a definite plan of cooperation as outlined by the committee be put in effect as soon as possible. As this matter must have the attention of all Class A members of the Association it will be formally presented to them at the coming convention of the Association in September, and it is hoped that the report of the advisory committee will be adopted and the machinery set in motion for the cooperation of all electrical interests in the northwest.

SIERRA AND SAN FRANCISCO POWER COMPANY MAY PURCHASE PLANT

The power plant and system of the Tuolumne Transmission Company, which operates in part of Tuolumne county, is to be purchased by the Sierra & San Francisco Power Company if approval of the transaction is granted by the Railroad Commission. The approval is asked for in an application filed by the Sierra Company and the Pacific Gas & Electric Company which is operating the Sierra Company under lease. The price of the plant, according to the sale agreement, is $13,600.

The Tuolumne Company operated a generating plant known as the Clavey River power house. The plant broke down in 1916 and since then its customers have been served with energy purchased from the Sierra Company. The Tuolumne Company is not financially able to make necessary repairs and for this reason the purchase of the plant by the Sierra Company will prove of public benefit.

NORTHWEST IRRIGATION CONGRESS

The call has been issued for the convening of an irrigation and development congress to be held in Seattle, September 16 and 17, to be composed of delegates from the states of Oregon, Washington, Idaho, Montana and Wyoming. An educational program will be promulgated having for its purpose a vigorous campaign to secure speedy appropriation by Congress of funds for reclamation of arid lands of the West. It is a meeting of the greatest importance and it is expected that all of the states mentioned will be represented by a strong delegation. Chambers of Commerce will be represented by delegates and are giving every possible assistance to aid the success of the congress.

THE NEW INTERNATIONAL CHAMBER OF COMMERCE

The work of setting up the machinery of the newly organized International Chamber of Commerce is now under way in the temporary headquarters, at 33 rue Jean-Donjon, Paris. The permanent headquarters, which will be determined by the board of directors, will probably be located at the seat of the League of Nations. The electrical industry is interested in the recommendation to hasten the use of hydroelectric power in every way.

The outlook for the business "League of Nations" is very promising, according to American delegates who have returned to the United States from the Paris conference where the International Chamber was formed. They report that no more earnest group of men ever met for a greater cause than the 500 delegates from France, Italy, Belgium, Great Britain and the United States—the five foundation countries—who gathered for the purpose of building the machine which would be set in operation to deal with commercial problems between the nations.

American delegates point out that never before had the business interdependence of the world's commerce and the acute character of many of the pressing commercial, financial and economic problems been formally recognized. Nor had there ever been such a serious and united effort made to find common ground on which unity of thought and action might take place.

An idea of the broad extent of the work which the International Chamber means to cover may be gleaned by mentioning some of the points which were included in the program of the conference, as follows:

To make import and export trade easier.
Safeguard international trade against unnecessary waste and fraud.
Standardize international documents, practices and laws affecting commercial intercourse.
Remove international friction, much of which begins with commercial differences.
Increase the total production of the world, and make the product available to the people of the world.
Increase the mutual profit in international transactions thereby promoting international friendship which is the basis of peace.
Cultivate personal friendship between business men and bankers of different nations, thus reducing prejudice and misunderstanding.

The following recommendations were made to all countries:

To hasten the utilization of hydroelectric power in every possible way.
To hasten the carrying out of the measures which tend to have mineral fuel used in the most scientific and economic way.
To develop to the utmost the coal resources of the world.

TRADE NOTES

Court Decision —

The Coolidge Wrought Tungsten patent, under litigation for nearly five years, has been declared valid and infringed in a decision handed down late last week by Hugh M. Morris, Judge of the United States District Court, in the matter of the suit brought by the General Electric Company against the Independent Lamp and Wire Company of New Jersey.

Contracts for Electrical Installations —

NePage, McKenny Company, electrical engineers, contractors and manufacturers, Armour Building, Seattle, have recently secured contracts for complete electrical installations in numerous buildings in that city. Included in the list are the four-story Hardeman Hat Company building, West Seattle, Beacon and Greenwood telephone exchanges, Greenwood school, East high school annex and Lincoln high school, new National Bank of Commerce building and the two-story addition to the Arcade building. They also have the contract for installation of a 6600-volt pole line from Buckley to Spiketon, Washington, in connection with Pierce County Coal Company properties.

Representative to Locate in Seattle —

The Electric Storage Battery Company announces the appointment of George D. Luther as soliciting agent with offices at 811 White Building, Seattle. Mr. Luther joined the sales forces of the Boston office of The Electric Storage Battery Company in 1907. In 1910 he was made soliciting agent in Denver in which capacity he served until his recent appointment.

Statement Regarding Battery Company—

Recent advertisements of the Westinghouse Union Battery Company, Swissvale, Pa., have, unfortunately, led many to assume that the Westinghouse Electric & Manufacturing Company was entering the storage battery field. In order to clear away any misunderstanding, the Westinghouse Elecric & Manufacturing Company authorizes the statement that the Westinghouse Union Battery Company is owned and controlled by the Westinghouse Air Brake Company, Wilmerding, Pa., and the Westinghouse Electric & Manufacturing Company is not in any way connected with the manufacture, sale, distribution or service of its product.

Change in Sales Department —

B. A. Plimpton has tendered his resignation as sales manager with the Locke Insulator Manufacturing Company of Victor, N. Y., and his resignation has been accepted as effective August 15th. D. H. Osborne is for the present acting sales manager with this company.

LATEST IN EVERYTHING ELECTRICAL

(The rapidly increasing popularity of the one-man street cars makes the safety panel described on this page of more than usual interest since it is especially adapted to one-man operation. There are always on the market a myriad of new devices for the automobile, yet there is always room for such a well designed light as the one shown here. The story of how increased production and comfort are made possible through the use of electrically heated pattern plates is also told on this page.—The Editor.)

SAFETY PANELS FOR SAFETY CARS

The Brooklyn Rapid Transit Company recently placed with the J. G. Brill Company, Philadelphia, an order for 200 safety cars, which is the largest order ever given for this type of equipment. As is well known, these cars are for one-man operation and hence must be equipped with highly specialized apparatus in order to insure easy, and at the same time absolutely safe, control.

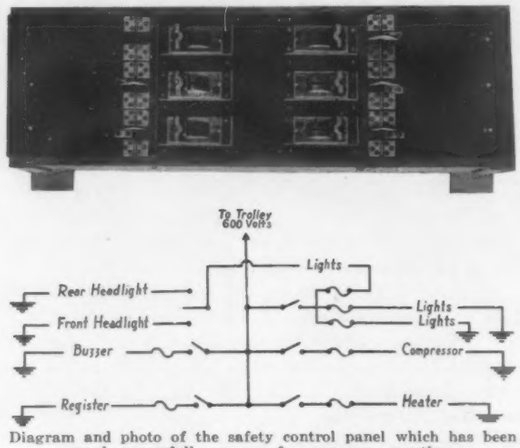


Diagram and photo of the safety control panel which has been used successfully on cars for one-man operation

Among the interesting details of the equipment of these cars are the safety control panels, which were specially designed by the Krantz Manufacturing Company, Brooklyn. These panels are of the Westinghouse-Krantz safety type for 600 volts, somewhat similar in design to those in use in the subway cars and stations of the Brooklyn Rapid Transit and New York Municipal Railway companies.

Each panel is mounted above the vestibule window within easy reach of the operator and carries six switches controlling, respectively, the car lights, compressor, heater, head lights, buzzer, and register. Each switch is mounted in a separate compartment with a bakelite-micara cover and molded asbestos composition sides which form arc shields between adjacent switches. N. E. C. fuse connections for each switch are also mounted in individual compartments.

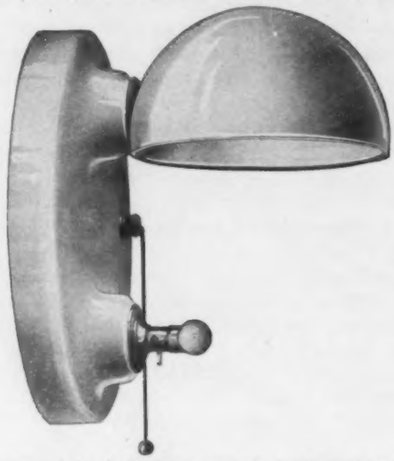
The design is such that not only is it impossible for the motorman to touch live parts when operating the switches but the cover of each fuse compartment is so inter-locked with the corresponding switch that it can be opened only when the switch is off and all reachable parts dead. Hence there is no possibility of injury in handling the panel.

The switches are of single-pole, double-break, quick-break, brush type with brushes protected by arcing tips. All are single throw except the headlight switch which controls the headlight at each end of the car and is therefore double throw.

Service conditions demand that the size and weight of the panel be kept to a minimum. Its dimensions are 30½ by 10 by 4½ inches and its weight 45 lbs.

NEW AUTOMOBILE LAMP

This new auxiliary is a two-candlepower, six-volt automobile lamp, operated in connection with a transformer incorporated in the base. This is for alternating current only, 110-115 volt, 60 cycles.

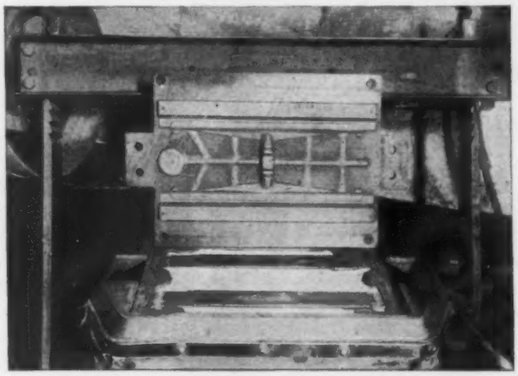


The above is one of the Aglite lamps manufactured by the Luminous Unit Company, division of the St. Louis Brass Manufacturing Company

The size bulb used here is available anywhere and its average life is comparatively long. The current consumption of the auxiliary lamp and transformer is negligible.

METAL PATTERN PLATES ON MOLDING MACHINES

The production of clean, smooth castings from molds made with metal patterns depends upon there being no sticking of molding sand to the patterns when they are removed from the sand. There is a tendency for moisture to collect on the cold metal pattern from the moist sand, or for the cold plate to "sweat," during which process moisture collects on it. When this moisture collects, the sand sticks to the pattern being removed from the mold, and the mold acquires a rough surface, so that when the metal is poured, the casting



The electrically heated metal pattern plates which the Westinghouse Company has developed for use on moulding machines.

will have a rough surface. This pattern will now have a rough surface due to the adhering sand, so that when the next mold is made, it will have a rough surface unless the pattern is cleaned off and dried. This trouble is experienced summer and winter.

The collection of moisture can be prevented by heating the pattern. The heat applied, however, must not be so great as to cause the sand in the mould to dry, as it would then crumble away and again the casting would have a rough surface. Furthermore, the heat must be applied in such a way that the pattern can be conveniently changed when desired.

The usual method of heating is by means of a gas flame left burning in the space underneath the pattern within the framework of the molding machine. It is difficult to keep the flame low enough so that it will not heat the pattern too much. A larger flame than necessary is, therefore, employed at some distance from the surface of application. This makes an inefficient arrangement, as most of the heat is dissipated into the surrounding space. The surrounding air becomes contaminated by the gas fumes, and in summer there is the further discomfort due to the heating of the surrounding air.

Book and Bulletins

A Complete Catalog

Catalog 22, issued by the Benjamin Electric Manufacturing Company of Chicago, comprises a complete listing, descriptions and illustrations of Benjamin electrical specialties.

In addition to the catalog data there is a section devoted to useful information upon illumination requirements and also a chapter setting forth simple rules for laying out lighting plans for the attainment of correct industrial lighting. A numerical index gives full details covering catalog numbers, list prices, package quantities, weights and discount schedules. For convenience the material listed in this catalog is grouped into schedules, with mechanical separators, tabbed for quick reference.

Seven Centuries of Brass Making

This is an exceptionally artistic trade booklet, published by the Bridgeport Brass Company of Bridgeport, Connecticut. A brief history of the ancient art of brass making is given and the early, and even recent methods of production are contrasted with that twentieth century achievement, the Electric Furnace Process.

The important steps in the making of tubes, sheets, rods and wire are described and illustrated. Following a description of the Bridgeport plant there is a discussion of the properties of brass as affected by composition, cold-working and heat treatment with the idea of assisting engineers in drawing specifications.

The publishers state that in the compilation of this work they have deviated from age-old conventions and traditions of the brass industry by making an open book of the practices and processes of brass making.

Turbine Installations

An album of plant installations of impulse and reaction turbines is a recent publication of The Pelton Water Wheel Company. The many beautiful illustrations here presented show Pelton units operating under widely varying conditions of head, volume and capacity. Views are shown of horizontal and vertical turbines of both types as they are used in large generating stations, in automatic and remote control plants and in exciter sets.

The Volt Introduces Itself

The Volt, the new house organ of the California-Oregon Power Company, made its initial bow with an attractive July, 1920, issue. The readers are asked to imagine this little publication as a young rambler out to see what he can see, his itinerary mapped out by the COPCO transmission lines. He has a healthy interest in everything he sees and while interested and amused in it all, he does not neglect to give it serious consideration, for much of it may have important bearing on his future welfare. This explains the way The Volt plans to function.

Paul B. McKee, Vice-President and General Manager, announces that through this organ the company plans to tell its friends both in and out of the organization what it is doing. He also states that the columns of The Volt are open to all and that the Division Managers will be glad to receive items of interest. The many friends of the California-Oregon Power Company wish The Volt a successful career.

Lighting from Concealed Sources

In order to supply the architect with working information on lighting applications the National X-Ray Reflector Company is presenting a series of plates on the lighting of residences, display rooms, offices and clubs. These include diagrams of the floor plan of the interior in question showing the location of all sources of light. Diagrams of column clusters, lighting pedestals and incandescent bowls are also given so as to show the beautiful and numerous effects which can be obtained by lighting from concealed sources.

Binder to Aid Advertising Campaign

The Sprague Electric Works have issued a special binder which contains advance information for the use of sales forces in the preparation for the Spraguelet Sales and Advertising Campaign which is to begin on September 1st, 1920. This company is presenting a new conduit body line which it regards as a distinct contribution to the art of exposed wiring.

Descriptions and illustrations of the Spraguelet sample board and wall hanger as well as helpful booklets and stickers are found in this binder along with a number of samples of recommended and obviously effective advertising.

This advance information is for the use of salesmen in becoming acquainted with the possibilities of this line and with the publicity backing the company proposes to put behind them.

Engineering Report

Engineering Report No. 303, published by the Electric Service Supplies Company, deals with "Golden Glow" and glass reflectors in their relation to the locomotive headlight question, and presents in concise form a large amount of valuable information in connection with this vitally important problem. It has been divided into individually numbered paragraphs and the whole prefaced by a complete index for easy and quick reference to any of the various matters covered.

The report shows essentially the inherent differences between glass and metal reflectors, as well as between optically correct and optically incorrect (ground and unground) glass reflectors; it treats of the marked superiority of glass over metal reflectors and how through their use the cost of headlight maintenance may be reduced to very low figures; it discusses the costs of glass reflectors, candle power and cost of candle power obtainable from same, as well as the limitations imposed on their production both from the standpoint of actual manufacture as well as cost to consumer. Headlight cases are discussed along broad, fundamental lines and those facts of design and manufacture resulting in low case maintenance are prominently given.

NEW ELECTRICAL DEVELOPMENT

(From the Northwest comes the announcement that work on the Link river dam is to commence immediately and of the installation of a 100-kw. Curtis steam turbine in a big lumber company's saw mill. A report of the breakdown of big generators in the Sacramento plant of the Pacific Gas & Electric Company is among Pacific Central items. The Southwest gives the latest word of the city of Los Angeles on its recent filings for water power rights, while news of notable industrial applications of electricity and of plans for the erection of a two-million dollar reservoir and canal comes from the Intermountain district.—The Editor.)

THE PACIFIC NORTHWEST

PORTLAND, ORE.—The Electric Maid Shop has made application to increase its capital stock from $3,000 to $10,000.

PORTLAND, ORE.—The Long Bell Lumber Company plan the erection of several large saw mills throughout the Northwest, which will be partially or entirely electrically driven.

RIDGFIELD, WASH.—Brattlie Bros. Mill Co. are installing a number of motors in an addition to their present saw mill. This company is also installing a three-machine shingle mill.

TACOMA, WASH.—The Consumers Heating Company has been granted permission to erect a plant for furnishing heat to several hundred customers. The cost of the plant is estimated at $100,000.

PORTLAND, ORE. — The employes of the Portland office of the Western Electric Company enjoyed a pleasant picnic and swim, Saturday, August 7, at their annual picnic held on the Clackamas river.

ST. HELENS, ORE.—The 1000-kw. Curtis steam turbine for supplying the energy for the electric drive for the St. Helens Lumber Company's saw mill has arrived, and installation work will proceed as rapidly as possible.

WOODLAND, WASH.—The Woodland franchise and equipment of the Washington-Idaho Water, Light & Power Company has been sold to the Lewis River Light & Power Company, who contemplate rebuilding the city lines as well as making other extensions and improvements.

BANDON, ORE.—A survey is being made for the new 1000-kw. lighting plant and 18-mile transmission line to be constructed at this point. The city has made application to the state engineer for permission to appropriate 25 second-feet of water from Wilson Creek for developing power.

SALEM, ORE.—Application has been made by R. J. Hendricks of Salem for permission to construct a reservoir to store 1500 acre-feet of water, from Trask river in Tillamook county, and for use of 1000 second-feet of water from the above reservoir and Trask river for developing power.

KLAMATH FALLS, ORE.—Work on the Link river dam, which will control the storage of the upper Klamath Lake, according to the announcement of J. C. Thompson, division manager of the Northern California-Oregon Power Company, is to be commenced at once. The dam is to cost $8,000.

REEDSPORT, ORE.—At a special election on August 14th the Reedsport charter was amended so as to permit the issue and disposal of 25-year general obligation bonds, in an amount not to exceed $50,000. The proceeds will be used to construct and maintain an electric light and power plant.

SALEM, ORE.—Frank Readen, of Bay City, asks permission to construct a reservoir for the storage of 10,000 acre-feet of water from Wilson river, and for permission to appropriate 1,000 second-feet of water from this reservoir and Wilson river for power to be used in the operation of a pulp mill.

SALEM, ORE.—The city of Toledo has filed application with the state engineer for permission to appropriate 300 second-feet of water from the Siletz river, for domestic, manufacturing and power purposes. An impounding dam and 19 miles of pipe line will be constructed. The project is estimated to cost $250,000.

SALEM, ORE.—W. H. Ales has applied to the state engineer for permission to appropriate 300 second-feet of water from Foley creek, tributary to Nehalem river, for power purposes. A flume 60 feet long, with dam and turbine, will be installed at a cost of $2,000. The applicant is evidently mistaken in the quantity of water he requests as he intends to develop but 50 hp.

WASCO, ORE.—The Sherman Electric Company will soon begin construction of 37 miles of 22-kv. transmission line, to serve the towns of Wasco, Moro and Grass Valley, as well as farmers along the route of the line. The new line will be supplied with power through a 66 to 22-kv., 500-kv. step down transformer at Dufur, where power will be purchased from the Pacific Power & Light Company.

YAKIMA, WASH.—C. F. Wilson, city engineer of Yakima, presented a report on the cost of the proposed municipal irrigation system, which he figures at $400,000. It is planned to construct the system, which will cover the entire residential district, this fall and winter, so that it will be ready for the growing season next year. The improvement will be paid for through bonds issued on local improvement districts.

SALEM, ORE.—Roy E. Swigert of Montague, Siskiyou county, Cal., as trustee for the proposed Klamath-Shasta Valley irrigation district, has made application to state engineer Cupper for a permit to appropriate 1,500 second feet of water from Klamath river for irrigating 150,000 acres of land and for developing power. The main canal is to be forty miles long. Other details of construction have not been determined.

YAKIMA, WASH.—The terms and form of the proposed Yakima irrigation district's contract with the United States reclamation service, which provides that the latter supply the district with 150,000 acre-feet of water yearly upon completion of the Rimrock storage reservoir, was approved recently by the Government. The irrigation district comprises 45,000 acres of land at Wenas, Moxee and Selah valleys. The cost of the storage will be $1,040,000, which will be paid in 40 semi-annual payments.

SEATTLE, WASH.—The Seattle offices of the Western Electric Company have begun appointing distributors and dealers in the Northwest to handle Titan automobile storage batteries, which equipment is now being distributed exclusively by this corporation. The Seattle offices will have under its jurisdiction all of Oregon, Washington and Alaska, the western half of Montana and northern half of Idaho. Plans have been formulated for going after business in this field in a masterful and efficient way.

THE PACIFIC CENTRAL DISTRICT

ALAMEDA, CAL.—The Alameda municipal electric plant netted $71,000 profit during the last fiscal year and still provided current at pre-war rates.

TERRA BELLA, CAL.—E. R. Clemens, secretary of the Terra Bella irrigation district, is seeking bids for drilling wells and pump and motor equipment.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has a crew of surveyors at work at Spring Gap, below Strawberry, planning for the construction of a $2,000,000 power plant.

ARBUCKLE, CAL.—A pumping plant which will cost over $11,000 will be installed at the Brown-Sullinger-Knox orchard, two miles south of Arbuckle. Seventy-five acres of almonds will be irrigated.

BERKELEY, CAL. — The Southern Pacific Company has awarded the contract for the rehabilitation of the track of electric line between Berkeley and Albany to Hutchenson Co., 17th and Broadway, Oakland, for $160,000.

FRESNO, CAL.—Fresno was without electric power and light for five hours recently as the result of a fire that broke out in the garage of the San Joaquin Light & Power Corporation on Fresno Street. The damage to the power plant was estimated at $5,000.

REDDING, CAL.—Power is so low the P. G. & E. cannot keep the pumps going to capacity at the Redding waterworks. Sprinkling of lawns and irrigation in all forms were recently forbidden for two days so enough water could accumulate in the reservoir for domestic and fire purposes.

FRESNO, CAL.—The San Joaquin Light & Power Corporation will spend $140,000 in the erection of new buildings to replace those recently destroyed by fire. The engineering department of the company is preparing the plans, which will be completed shortly, and work will start within the next ten days.

EUREKA, CAL.—Contracts for building the concrete dam at the intake of the Eureka Water Works on Elk River and for putting concrete covering on the 700 feet of exposed wooden stave pipe have been awarded by the city council. The Mercer-Fraser Company secured the contract for the dam on their bid of $4995, and Elsemore & Jacobs for the pipe covering on its bid of $5300.

SAN FRANCISCO, CAL.—E. H. Rollin & Sons are advised that the Great Western Power Company of California first and refunding mortgage 6 per cent bonds, due 1949, have been approved as a legal investment for savings banks in California. The first mortgage 5 per cent bonds, due 1946, of the same company had already been approved and are held by many savings and commercial banks in California.

SAN JOAQUIN, CAL.—Work will start immediately on the construction of a substation in this district by the San Joaquin Light & Power Corporation. A contract has been signed between the power company and the San Joaquin Valley Farm Lands company, the James irrigation district and the Tranquillity irrigation district for the construction of the station and the delivery of power not later than March 1, 1921.

SAN FRANCISCO, CAL.—Conferences with H. G. Butler, state power administrator, were arranged by officials of the Municipal Railroads and the United Railroads, as a result of Butler's order for a general reduction of 20 per cent in the use of electric power, agriculture being the only exception. Superintendent Frederick Boeken of the city lines said that the service would permit of no reduction without inconvenience to the public. He said it might be necessary to

establish turning back points on various outer lines, giving a reduced service in the outermost regions. The power reduction, due to water shortage, must be made between 7 a.m. and 10 p.m.

STOCKTON, CAL.—At a conference in San Francisco between John A. Britton, general manager of the Pacific Gas & Electric Company, and Mayor A. C. Oullahan of Stockton, tentative overtures were made recently for the purchase by the city of the local water plant operated by the company. As a result of the conference it is probable that the State Railroad Commission will be asked to survey the Stockton properties of the company and fix a legitimate sale value thereon.

SACRAMENTO, CAL.—Tentative plans of Colonel R. B. Marshall of the United States Geological Survey for irrigating practically the entire interior of California through the means of water storage and a gigantic canal system, starting at the proposed dam site of the Iron Canyon Project in Tehama county, have been outlined before the Sacramento Valley Water Users' Committee on Organization which met here for the first time. While admitting his scheme is one of the most comprehensive ever proposed and would cost millions of dollars, he expressed the belief that the project is not only feasible but probably the only permanent solution of the water shortage problem.

SACRAMENTO, CAL.—The breakdown of the big generators in the Sacramento plant of the Pacific Gas & Electric Company reduces the source of the electric supply of the main system extending from Shasta to San Francisco by 10,000 horsepower, or more than 7,000 kilowatts. So serious is the trouble, with a threatened shortage of the local plant for several months while new equipment is ordered and installed, that officials of the company were forced to visit Sacramento for the purpose of making an investigation. They included President Creed, P. M. Downing, vice-president in charge of the electrica lequipment, and John A. Britton, vice-president and general manager. Although the drum power plant in the mountains near Grass Valley has been started, following a shut-down of two months, the breakdown of the Sacramento unit seriously menaces the mining districts, which need power for their machinery. Further curtailment of power to irrigationists throughout the Sacramento valley also is considered probable.

THE PACIFIC SOUTHWEST

GALLUP, N. M.—The question of constructing a reservoir is being agitated by the Bluewater people.

SIERRA MADRE, CAL.—A public comfort station will be constructed in the proposed Pacific Electric Railway station.

SAN FERNANDO, CAL.—The board of trustees are planning to increase the capacity of the reservoir 323,000 gallons, by raising its walls sixteen inches.

RIVERSIDE, CAL.—The engineer and superintendent of the water department have been instructed to prepare estimates of the cost of the pumping plant, sinking of wells and laying necessary pipe lines.

LONG BEACH, CAL.—A bond election will soon be called to vote on $1,000,000 harbor bonds, with which it is proposed to dredge Channel No. 3 and the turning basin to a depth of 25 feet, to widen Chinnel No. 3 and do a large amount of bank protection.

PASADENA, CAL.—Further offerings of municipal bonds were announced by the Harris Trust and Savings Bank, E. H. Robbins & Sons and the National City Company, in an issue of 4¾ per cent Pasadena Electric Light system bonds. The bonds will yield 5.81 to 5.60 per cent according to maturity. The issue amounts to $222,000.

MESA, ARIZ.—A petition asking for the organization of an irrigation district, to be named the Auxiliary Eastern Canal Irrigation District and embracing several thousand acres of land lying east of the Mesa, has been approved by the Board of Supervisors and the date of election for approval set for September 4th. Canals and distributive systems are to be built and operated by the district under contract with the Salt River Valley Water Users' Association.

SAN DIEGO, CAL.—The engineering and irrigation experts and the representatives of allied interests throughout the Southwest met recently for a conference with Arthur P. Davis, director of the reclamation service of the United States. An entire day of discussion ended in the unanimous agreement that the mammoth project of the Boulder Canyon dam on the Colorado river, with the attendant power and irrigation development, should be thoroughly investigated and that the report upon it be presented to Congress next fall and carry with it the hearty endorsement of civic, irrigation and state organizations throughout the Southwest.

LOS ANGELES, CAL.—No interference will be made by the city of Los Angeles if officials of San Francisco file a protest against the claims made by this city to the headwaters of the Tuolumne and Merced rivers and Yosemite creek as a source of hydroelectric power, it has been announced by officials of the Public Service Department. Special Counsel W. B. Mathews of the department said that Los Angeles has no intention of pressing any claim to the water of any stream that may interfere in any way with San Francisco's municipal enterprise. He pointed out that one of the city's filings is on the Tuolumne river and Return creek, while the other filing is on the south fork of the Merced river and Illilouette creek in Mariposa and Madera counties. The latter filing covers a possible power plant site above the Vernal Falls in the Yosemite National Park. President Robertson and Mr. Mathews say that these filings are only preliminary, and made to determine the possibilities and opportunities, in accordance with the department's plan for the future development and expansion of the Los Angeles power project.

THE INTER-MOUNTAIN DISTRICT

VERNAL, UTAH.—The Uintah Telephone Company of Vernal has petitioned the Public Utilities Commission of Utah for an increase in its rental rates.

BOISE, IDAHO.—The Idaho Power Company has begun the preliminary work of building an additional high tension transmission line from its generating plant at Thousand Springs to Caldwell.

MAGNA, UTAH.—The town of Magna has just inaugurated its new twenty-two-mile street lighting system, which was the occasion of a celebration including a banquet, at which the commissioners of Salt Lake county were the principal speakers.

RUPERT, IDAHO.—The engineering and maintenance of the seven pumping stations on the north side of the irrigation district were recently taken over by the Rupert Electric Company. Hitherto the work was handled from Burley. A day and night service is maintained.

SALT LAKE CITY, UTAH.—According to Ralph R. Woolley, hydraulic engineer of the water resources branch of the U. S. Geological Survey, there is a splendid chance that congress will favorably consider the Western reclamation bill for $250,000,000 for irrigation in the Western states.

SALT LAKE CITY, UTAH.—Members of the congressional committee who recently inspected the proposed project of the construction of the American Falls reservoir, for the irrigation of 1,000,000 acres of land, were favorably impressed with the possibilities, and the outlook is exceedingly encouraging. Irrigation companies have contracted for a large portion of the water which will be impounded.

VIRGINIA CITY, NEV.—By virtue of an order from the U. S. Reclamation Service the Nevada Valleys Power Company cannot further furnish power to Hazen, Toy, Toulin, Rochester, Packard and Mill City, all the available power being required to supply the needs of Fallon, which has prior rights under an old contract with the government.

CARSON CITY, NEV.—The Truckee River General Electric Company has applied for authority to discontinue its electric transmission line from Bluestone Mine Station to Pine Grove. Protests have been made by consumers and a hearing will be held before the Public Service Commission on September 7.

SALT LAKE CITY, UTAH.—It has been officially announced by the local representative of the International Brotherhood of Electrical Workers that their strike in Salt Lake City and Ogden is over. The vote to strike was taken January 13th and the vote to declare off the strike was taken August 16th.

SOLDIER SUMMIT, UTAH.—The Utah Power & Light Company is extending service to a number of new homes in Soldier Summit, which is a new railroad town on the D. & R. G. The D. & R. G. railroad company is to build a 40-room addition to the hotel and also construct 50 additional cottages, in addition to the homes which have already been built to take care of the families of men who have been permanently assigned here.

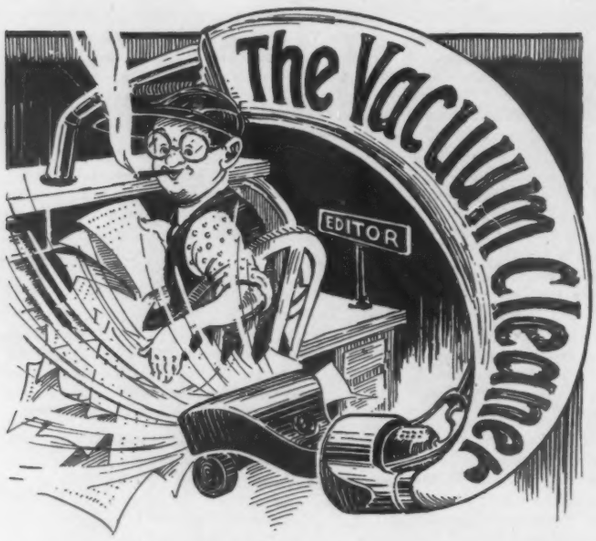
SALT LAKE CITY, UTAH.—Extension of Salt Lake's "whiteway" on Main Street to State, Broadway and Fourth Streets has been definitely put into effect by the city commission creating three new lighting districts. Petitions requesting the creation of the new lighting districts were filed with the city commission early in May, and were referred to the legal and engineering departments. The creating of the new districts is the outcome of these petitions.

RENO, NEV.—To assure permanent relief to the water users of western Nevada dependent upon the Lake Tahoe storage, and to bring about reclamation of at least 50,000 additional acres in this section, Governor E. D. Boyle and State Engineer Scrugham have proposed to the reclamation service that a large storage reservoir be constructed near Reno to conserve the flood waters of the Truckee river. Cost of the reservoir and main canal system is estimated at $2,000,000.

SALT LAKE CITY, UTAH.—There appears to be considerable likelihood that an irrigation company will be organized to provide water for the district of 30,000 acres south and west of Utah Lake, thereby increasing the production of one of the most fertile areas in the state of Utah and one easily susceptible of irrigation. The plans would require the abandonment of the present pumping plant of the Mosida project, and the installation of another electrically operated pumping plant south of Pelican point, on the west shore of Utah lake.

SALT LAKE CITY, UTAH.—Appeal has been taken by the Telluride Power Company from the decision of the state engineer, refusing to grant further extension of time to the company to make proof of appropriation of 40 second-feet of water from Beaver river. The case will be tried in the court of the Fifth judicial district. Proof was made that expenditures of $30,000 had been incurred in 1918 and $25,000 in 1919. It was urged that two years' additional time would be required to conclude the power development, and an indefinite extension of time in which to prove up on the application as originally filed, was asked.

MURRAY, UTAH.—Utah's first zinc smelter, now nearing completion at the station known as Fireside, about a mile north of Murray, will begin operations about October 1st by the Utah Zinc Company, which is constructing the smelter at a cost of $150,000. This smelter will have an initial connected load of 200 hp.



Being a little sunbeam is a regular career if you give it some serious thought. Says a contemporary:

"Make one person happy each day and in forty years you have made 14,600 human beings happy for a little time at least."

That is all very well, but we believe in large-scale production and modern efficiency if you are going into the business at all. For instance, if you fall backwards into the street car every morning as you start for work, you can make a whole car full of people happy at one fell swoop. If you put your coat on backwards when you go out to lunch at noon you can provide wholesome amusement for the pedestrians on several city blocks; in fact, if you use your imagination and ingenuity you can bring up the total of your victims to far more than 14,600 human beings in a year.

* * *

Big business is at it again. The Railroad Commission records an application by the two owners of a water plant in Orange county, to increase the rate they are charging their one consumer for domestic and irrigation water.

* * *

A whistling locomotive is not merely making itself conspicuous. Every little whistle has a meaning all its own, thus:

One short, sharp blast while train is running—the simplest of all signals and the most alarming. It is addressed to the trainmen and means, "Apply hand brakes. Help me stop." It is given when the airbrakes fail, and with the perfection of modern airbrakes is seldom heard.

Two long blasts—"Release the brakes and thank you." This also is addressed to trainmen.

One long blast followed by three short ones—Addressed to flagman on rear of train and says, "Go back along the track and protect this train so long as we are standing here."

Three long blasts—If given while train is in operation this means that the train has parted.

Two short blasts—This familiar signal from the engineer is an acknowledgment of some signal that has been given for his benefit. It corresponds to "I got you, Steve."

Three short blasts while train is standing—"I'm going to back up."

Four short blasts—This is the engineer's method of asking for instructions or calling for necessary signals.

One long followed by two short blasts—This calls the attention of yard engines of extra trains waiting on sidings to the fact that signals are being carried indicating that another section is following. Unless a reply is received that the signal is understood the engineer will stop his train and find the reason why. Two toots will satisfy him on the subject and nothing else.

Two long whistles followed by two short—Given while approaching public crossings at grade and means "Stop, look and listen, please."

Three long whistles—Given when approaching stations, junctions, railroad crossings at grade and mail cranes located between stations.

Two short blasts three times—This means that the airbrakes are sticking and the engineer wants the train crew to investigate.

Two shorts and one long—Used where there are two or more engines on a train as a signal to transfer air control from one locomotive to another.

Two short blasts repeated—Addressed to engineman on second engine and is a request that he assist in recharging air.

A succession of short whistles—This is addressed usually to cattle on the track. It means "—— !!! —— ?!"

A new scientific law has been discovered by the ex-president of Johns Hopkins. It is as follows: "In any discussion, the heat evolved varies inversely with the knowledge displayed." A writer on the subject continues:

"Expressed as a formula, this law takes the form K equals C-K, in which C is a constant, the value of which depends upon the units used for H and K.

"In order to determine the value of C, I recently performed, with the help of the Professor of Heating and Ventilation and the Professor of Political Science, an experiment on two speakers at a debate on the League of Nations. The heat evolved was determined by directing a measured quantity of air at a given temperature against the speakers and noting its increase in temperature; the knowledge displayed was determined by the Professor of Political Science.

"As a result of this experiment, I am able to announce that when the heat units are expressed in B.t.u. and the units of knowledge in ounces, the value of C becomes 1. Applications are simple. It is estimated that a million B.t.u.'s are evolved in the course of one afternoon of debate in the United States Senate. Substituting this value in the above equation, the value of K becomes one one-millionth of an ounce."

* * *

Electrical phenomena accompanying a severe dust storm in the Middle West are reported in a newspaper as follows:

"Barbed wire fences became charged and one, in an authenticated instance, set fire to dry grass and caused a prairie fire.

"A dog chained to a wire clothes line set up a prolonged howling and when its master tried to unsnap the chain he got such a shock as to reveal unmistakably the cause of the canine's woe.

"Balls of fire, according to cattlemen, formed on the tips of the cattle's horns. A country ranchman reported driving a bunch of cattle through the storm at night with the cattle furnishing a continuous display.

"Automobiles on highways in the western part of the state halted without explanation. Batteries in many instances were burned out and persons touching metal parts received shocks.

"An electrician got his automobile going as usual by letting a wire trail behind the car which grounded the charge.

"Cooking utensils on stoves became so highly charged that housewives had to use flatiron holders or gloves to avoid a shock."

Never a dull moment in very dry districts like this.

* * *

The force of habit is sometimes a very present help in time of trouble, especially if the trouble is of such a violent nature as to shake one's presence of mind. The perfect example of "business as usual" is the hero of the following story. There had been a bad train wreck, and on the relief train rushed to the assistance of the injured passengers was the brisk and inevitable reporter. The first person he saw as he made his way towards the wreckage was a man sitting in the road with his back to a fence. He had a black eye, his face was somewhat scratched, and his clothes were badly torn—but he was entirely calm.

The reporter jumped to the side of the man against the fence. "How many hurt?" he asked of the prostrate one.

"Haven't heard of anybody being hurt," said the battered person.

"What was the cause of the wreck?"

"Wreck? Haven't heard of any wreck."

"You haven't heard of any wreck? Who are you, anyhow?"

"Well, young man, I don't know that that's any of your business, but I am the claim-agent of this road."

* * *

Devotion to duty has a touching exponent in the prominent delegate to an electrical convention who met with an automobile accident, but pulled himself together the following day and appeared in three sections.